

ACS850

Application guide
Fieldbus control with
FPBA-01 PROFIBUS DP adapter module and ABB AC500



ACS850 Drive Manuals

DRIVE HARDWARE MANUAL*

ACS850-04 Drive Modules (1.1 to 45 kW) Hardware Manual – 3AUA0000045496 (English)

ACS850-04 Drive Modules (55 to 160 kW) Hardware Manual – 3AUA0000045487 (English)

ACS850-04 Drive Modules (200 to 500 kW) Hardware Manual – 3AUA0000026234 (English)

DRIVE FIRMWARE MANUAL

ACS850 Standard Control Program Firmware Manual** – 3AUA0000045497 (English)

DRIVE PC TOOLS MANUALS

DriveStudio User Manual – 3AFE68749026 (English)

DriveSPC User Manual – 3AFE68836590 (English)

APPLICATION GUIDES

Safe Torque Off Function for ACSM1, ACS850 and ACQ810 Drives Application Guide – 3AFE68929814 (English)

System Engineering Manual – 3AFE68978297 (English)

ACSM1 Fieldbus Control with FPBA-01 PROFIBUS DP Adapter Module and ABB AC500 PLC; Application Guide – 3AUA0000049359 (English)

OPTION MANUALS

FIO-01 Digital I/O Extension User's Manual* – 3AFE68784921 (English)

FIO-11 Analog I/O Extension User's Manual* – 3AFE68784930 (English)

FIO-21 Analog I/O Extension User's Manual – 3AUA0000031061 (English)

FEN-01 TTL Encoder Interface User's Manual* – 3AFE68784603 (English)

FEN-11 Absolute Encoder Interface User's Manual* – 3AFE68784841 (English)

FEN-21 Resolver Interface User's Manual* – 3AFE68784859 (English)

FEN-31 HTL Encoder Interface User's Manual* – 3AUA0000031044 (English)

*A multilingual quick installation guide is included with the delivery.

**The delivery includes a multilingual quick start-up guide.

AC500 manuals can be found in the CoDeSys online help. Press F1 in the CoDeSys software.

Fieldbus control with FPBA-01 PROFIBUS DP adapter module and ABB AC500 PLC

Application guide

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Introduction to the manual

What this chapter contains

This chapter describes the target audience, purpose and contents of this manual.

Applicability

The manual is compatible with ACS850-04 drive modules of frame sizes from A to G.

Safety instructions

Follow the safety instructions given in ACS850-04 Drive Modules (1.1 to 45 kW) Hardware Manual – 3AUA0000045496 (English). The main instructions are repeated below.



WARNING! Ignoring the following instructions can cause physical injury or death, or damage to the equipment.

- **Only qualified electricians are allowed to install and maintain the drive.**
- Never work on the drive, motor cable or motor when main power is applied. After disconnecting the input power, always wait for 5 min to let the intermediate circuit capacitors discharge before you start working on the drive, motor or motor cable.

Always ensure by measuring with a multimeter (impedance at least 1 Mohm) that:

1. voltage between drive input phases U1, V1 and W1 and the frame is close to 0 V.
 2. voltage between terminals UDC+ and UDC- and the frame is close to 0 V.
 3. voltage between terminals R+ and R- and the frame is close to 0 V.
- Do not work on the drive when the permanent magnet motor is rotating. Also, when the supply power is switched off and the inverter is stopped, a rotating permanent magnet motor feeds power to the intermediate circuit of the drive and the supply connections become live. See the hardware manual for precautions before installation and maintenance work on the drive.
 - Do not work on the control cables when power is applied to the drive or to the external control circuits. Externally supplied control circuits may cause dangerous voltages inside the drive even when the main power on the drive is switched off.
-

Target audience

This manual is intended for people who plan the drive application control, commission, use, and service the drive with fieldbus communication. Read the ACS850 firmware and hardware manuals before working on the drive.

You are expected to know the fundamentals of electricity, wiring and electrical components as well as drive control methods, fieldbus communication concepts and function block programming.

Purpose of the manual

The purpose of this manual is to show how to configure fieldbus communication with the drive control program parameters and, as an example, to show how the drive can be controlled through fieldbus by using the ABB AC500 programmable logic controller with PS501 Control Builder.

Contents of the manual

The chapters of this manual are briefly described below.

[Introduction to the manual](#) introduces this manual.

[Fieldbus control description](#) describes how the drive can be controlled by external devices over a communication network.

[Communication profiles](#) describes the communication profiles used in the communication between the PROFIBUS network, the FPBA-01 module, and the drive.

[Installation and parameter setup for communication profiles](#) presents the steps to take during the start-up of the FPBA-01 PROFIBUS DP Adapter Module and the ACS850 drive. The chapter presents examples for different applications such as speed and torque control, sending reference over fieldbus and scaling.

[Starting up fieldbus communication and programming the ABB PLC](#) presents the steps to take during the start-up of the drive fieldbus control with ABB AC500 PLC and PROFIBUS DP adapter module. The chapter introduces the communication setup, the PLC program and visualizations, and explains how to run and test the program.

[ACS850 Crane Control Program supplement](#) presents parameter configuration and utilization demonstrations for ACS850 Crane control program over Profibus DP fieldbus. Demonstrations contains examples for speed and torque control, stopping and starting cycles and fault simulation.

[Appendix A - How to find out the serial communication parameter values of your PC?](#) instructs how to find out the serial communication parameter values of your PC.

Related manuals

- *ACS850-04 Drive Modules (1.1 to 45 kW) Hardware Manual (3AUA0000045496 [English])*
- *ACS850-04 Drive Modules (55 to 160 kW) Hardware Manual (3AUA0000045487 [English])*

- *ACS850-04 Drive Modules (200 to 500 kW) Hardware Manual* (3AUA0000026234 [English])
- *ACS850 Standard Control Program Firmware Manual* (3AUA0000045497 [English])
- *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English])
- *User Manual for PLC Programming with CoDeSys 2.3* by 3S – Smart Software Solutions GmbH
- ABB AC500 scalable programmable logic controller manuals. For online help, press F1 in the CodeSys software

Terms and abbreviations

Term/Abbreviation	Explanation
CM572	Profibus DP Master communication module for AC500
CM575	DeviceNet Master communication module for AC500
CM578	CANopen Master communication module for AC500
CPU	Central Processing Unit
FCAN-0x	Optional CANopen adapter for ACS850
FDNA-0x	Optional DeviceNet adapter for ACS850
FPBA-0x	Optional PROFIBUS DP adapter for ACS850
Frame (size)	Size of the drive module.
GSD	Generic Station Description. A GSD file contains a description of the PROFIBUS DP/PA device and is provided by the device manufacturer.
PROFIBUS DP	PROFIBUS version for Decentralized Periphery. PROFIBUS is an open serial communication standard that enables data exchange between all kinds of automation components.
PROFIBUS PA	PROFIBUS version for Process Automation.

Standards

IEC 61131-3:2003, Programmable controllers – Part 3: Programming languages.

IEC 61158 Type 3, Industrial communication networks – Fieldbus specifications.

IEC 61784-5-3 Industrial communication networks – Profiles – Part 5-3: Installation of fieldbuses – Installation profiles for CPF 3.

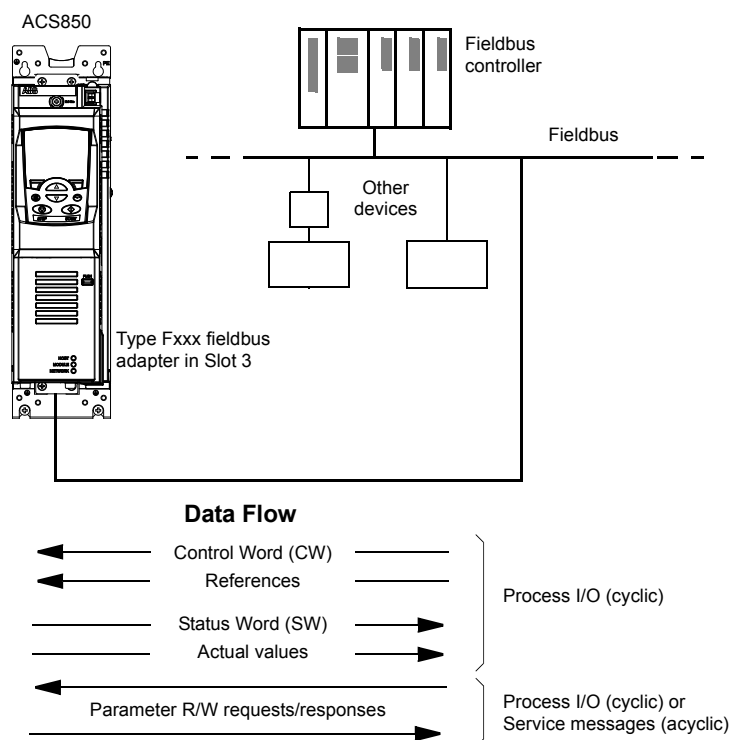
Fieldbus control description

What this chapter contains

The chapter describes how the drive can be controlled by external devices over a communication network. The chapter describes parameters related to the communication and the drive control.

System overview

The drive can be connected to a fieldbus controller via a fieldbus adapter module. The adapter module is connected to drive Slot 3.



The drive can be set to receive all of its control information through the fieldbus interface, or the control can be distributed between the fieldbus interface and other available sources, for example digital and analogue inputs.

The drive can communicate with a fieldbus controller through a fieldbus adapter using one of the following serial communication protocols:

- PROFIBUS DP (FPBA-01 adapter)
- CANopen (FCAN-01 adapter)
- DeviceNet™ (FDNA-01 adapter).
- Modbus/RTU (FSCA-01 adapter) or Modbus/TCP (FENA-01 adapter)
- LONWORKS® (FLON-xx adapter)

- Ethernet/IP™ (FENA-01 adapter)
- EtherCAT (FECA-01 adapter)

Setting up communication through a FPBA-01 fieldbus adapter module

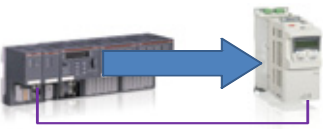
Before configuring the drive for fieldbus control, the adapter module must be mechanically and electrically installed according to the instructions given in the FPBA-01 user's manual.

The communication between the drive and the fieldbus adapter module is activated by setting parameter 50.01 FBA ENABLE to (1) ENABLE.

The adapter-specific parameters must also be set. See the table below. The Application-specific setting column is a setup for speed control using ABB Drives profile and PPO type 5.

Parameter	Setting for fieldbus control	Application-specific setting	Function/Information
COMMUNICATION INITIALISATION AND SUPERVISION 			
50.01 FBA ENABLE	(1) ENABLE	(1) ENABLE	Initialises communication between drive and fieldbus adapter module.
50.02 COMM LOSS FUNC	(0) NO (1) FAULT (2) SPD REF SAFE (3) LAST SPEED	(1) FAULT	Selects how the drive reacts in a fieldbus communication break.
50.03 COMM LOSS T OUT	0.3...6553.5 s	0.3	Defines the time between communication break detection and the action selected with parameter 50.02 COMM LOSS FUNC.
50.04 FBA REF1 MODESEL	(0) RAW DATA (1) TORQUE (2) SPEED	(2) SPEED	Selects the fieldbus reference FBA REF1 scaling and the actual value, which is sent to the fieldbus (FBA ACT1).
50.05 FBA REF2 MODESEL	(0) RAW DATA (1) TORQUE (2) SPEED	(1) TORQUE	Selects the fieldbus reference FBA REF2 scaling and the actual value, which is sent to the fieldbus (FBA ACT2).
FPBA-01 ADAPTER MODULE CONFIGURATION 			
51.01 FBA TYPE	Profibus DP	Profibus DP	Displays the type of the fieldbus adapter module.

Parameter	Setting for fieldbus control	Application-specific setting	Function/Information
51.02 NODE NUMBER	0...126	2	Each device on the Profibus network must have an unique node number. This parameter is used to define a node number for the drive it is connected to.
51.03 BAUD RATE	12000 6000 3000 1500 500 187 93 45 19 9	12000	This parameter indicates the detected communication speed in kbit/s. 12000 = 12 Mbit/s 6000 = 6 Mbit/s 3000 = 3 Mbit/s 1500 = 1.5 Mbit/s 500 = 500 kbit/s 187 = 187.5 kbit/s 93 = 93.75 kbit/s 45 = 45.45 kbit/s 19 = 19.2 kbit/s 9 = 9.6 kbit/s
51.04 TELEGRAM TYPE	(1) PPO 1 (2) PPO 2 (3) PPO 3 (4) PPO 4 (5) PPO 5 (6) PPO 6 (7) ST1	5	This parameter indicates the selected telegram type for the Profibus communication. Telegram type is automatically detected.
51.05 PROFILE	(0) PROFIdrive (1) ABB Drives (2) Transparent 16 (3) Transparent 32	1	This parameter is used to select which communication profile is used.
51.06 T16 SCALE	1...65536	100	Reference multiplier/actual value divisor for the FPBA-01. The parameter is only effective when Transparent 16 profile is selected and the drive is using FBA/DCU communication profile.
51.07 FBA PAR7	These parameters are not in use.		
...			
51.26 FBA PAR26			
51.27 FBA PAR REFRESH	(0) DONE (1) REFRESH	1	Validates any changed adapter module configuration parameter settings.
51.28 PAR TABLE VER	–		Displays the parameter table revision of the fieldbus adapter module mapping file stored in the memory of the drive.
51.29 DRIVE TYPE CODE	–		Displays the drive type code of the fieldbus adapter module mapping file stored in the memory of the drive.
51.30 MAPPING FILE VER	–		Displays the fieldbus adapter module mapping file revision stored in the memory of the drive.

Parameter	Setting for fieldbus control	Application-specific setting	Function/Information
51.31 D2FBA COMM STA	–		Displays the status of the fieldbus adapter module communication.
51.32 FBA COMM SW VER	–		Displays the common program revision of the adapter module.
51.33 FBA APPL SW VER	–		Displays the application program revision of the adapter module.
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 1 or A for parameters 51.01...51.26.			
TRANSMITTED DATA SELECTION FROM DRIVE TO PLC			
			
52.01 FBA DATA IN1 ... 52.12 FBA DATA IN12	0 Not selected 4 Status word (16-bit) 5 Actual value 1 (16-bit) 6 Actual value 2 (16-bit) 14 Status word (32-bit) 15 Actual value 1 (32-bit) 16 Actual value 2 (32-bit) 101...9999 Drive parameters (For example value 101 points to drive parameter 1.01)		Defines the data transmitted from drive to fieldbus controller and further to the PLC. Parameters are set according to the virtual address area of the drive. Note: If the length of the selected data is 32 bits, two parameters are reserved for the transmission.
52.01 FBA DATA IN1		4	Status word (16-bit)
52.02 FBA DATA IN 2		5	Actual value 1 (16-bit)
52.03 FBA DATA IN 3		6	Actual value 2 (16-bit)
TRANSMITTED DATA SELECTION FROM PLC TO DRIVE			
			
53.01 FBA DATA OUT 1 ... 53.12 FBA DATA OUT 12	0 Not selected 1 Control word 2 Reference 1 (16-bit) 3 Reference 2 (16-bit) 11 Control word (32-bit) 12 Reference 1 (32-bit) 13 Reference 2 (32-bit) 1001...9999 Drive parameters (For example value 1001 points to drive parameter 10.01)		Defines the data transmitted from fieldbus controller to drive. Note: If the length of the selected data is 32 bits, two parameters are reserved for the transmission.

Parameter	Setting for fieldbus control	Application-specific setting	Function/Information
53.01 FBA DATA OUT 1		1	Control word
53.02 FBA DATA OUT 2		2	Reference 1 (16-bit)
53.03 FBA DATA OUT 3		3	Reference 2 (16-bit)
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 3 or C for parameters 52.01...52.12 and 2 or B for parameters 53.01...53.12.			
51.27 FBA PAR REFRESH		(1) REFRESH	Validates any changed adapter module configuration parameter settings.

After the module configuration parameters have been set, the drive control parameters (see section [Drive control parameters](#)) must be checked and adjusted when necessary.

Drive control parameters

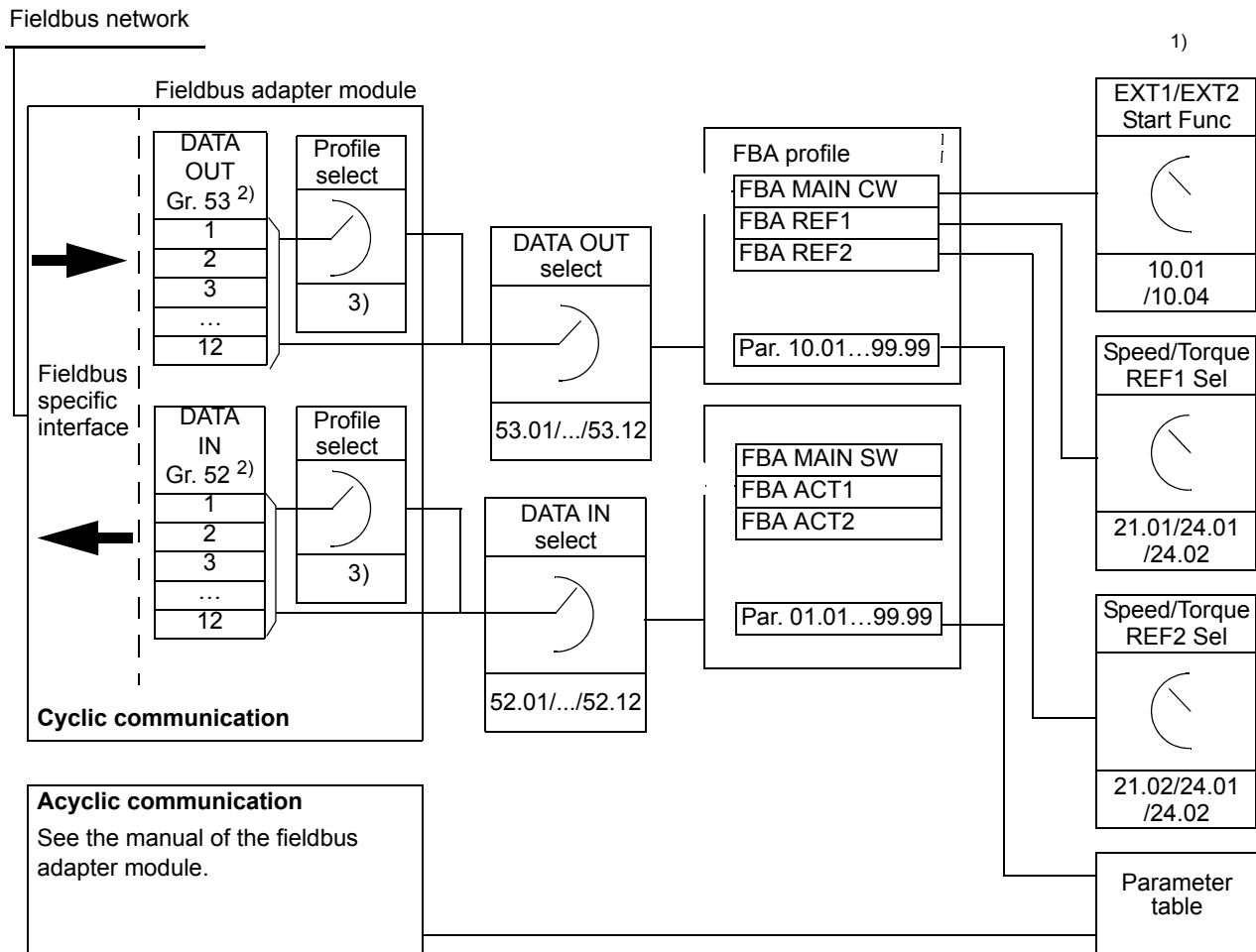
The Application-specific setting column gives the parameter values to use when the fieldbus interface is the desired source or destination for that particular signal. The Function/Information column gives a description of the parameter.

Parameter	Application-specific setting	Function/Information
CONTROL COMMAND SOURCE SELECTION		
		
10.01 EXT1 START FUNC	(3) FBA	EXT1 start and stop commands are taken from the fieldbus.
10.04 EXT2 START FUNC	(3) FBA	EXT2 start and stop commands are taken from the fieldbus.
12.03 EXT1 CTRL MODE	(1) Speed	Speed control. Torque reference is 03.09 TORQ REF SP CTRL.
12.05 EXT2 CTRL MODE	(2) Torque	Torque control. Torque reference is 03.12 TORQ REF SP LIM.
19.01 SPEED SCALING	1500	Defines the terminal speed value used in acceleration and the initial speed value used in deceleration. Speed reference scaling is defined by the used fieldbus profile (e.g. with ABB Drives Profile integer value 20000 corresponds to parameter 19.01 SPEED SCALING value). Signal 01.01 MOTOR SPEED RPM is sent to the fieldbus as an actual value.
21.01 SPEED REF1 SEL	FBA ref1	Selects the source for speed reference 1.
24.01 TORQ REF1 SEL	FBA ref2	Selects the source for torque reference 1.
SYSTEM CONTROL INPUTS		
16.07 PARAM SAVE	(0) DONE (1) SAVE	Saves parameter value changes (including those made through fieldbus control) to permanent memory.

The fieldbus control interface

The cyclic communication between a fieldbus system and the drive consists of 16/32-bit input and output data words. The drive supports at the maximum the use of 12 data words (16-bit) in each direction.

Data transmitted from the drive to the fieldbus controller (PLC) is defined by parameters 52.01...52.12 (FBA DATA IN) and data transmitted from the (PLC) fieldbus controller to the drive is defined by parameters 53.01...53.12 (FBA DATA OUT).



The Control Word and the Status Word

The Control Word (CW) is the principal means of controlling the drive from a fieldbus system. The Control Word is sent by the fieldbus controller to the drive. The drive switches between its states according to the bit-coded instructions of the Control Word.

The Status Word (SW) is a word containing status information, sent by the drive to the fieldbus controller.

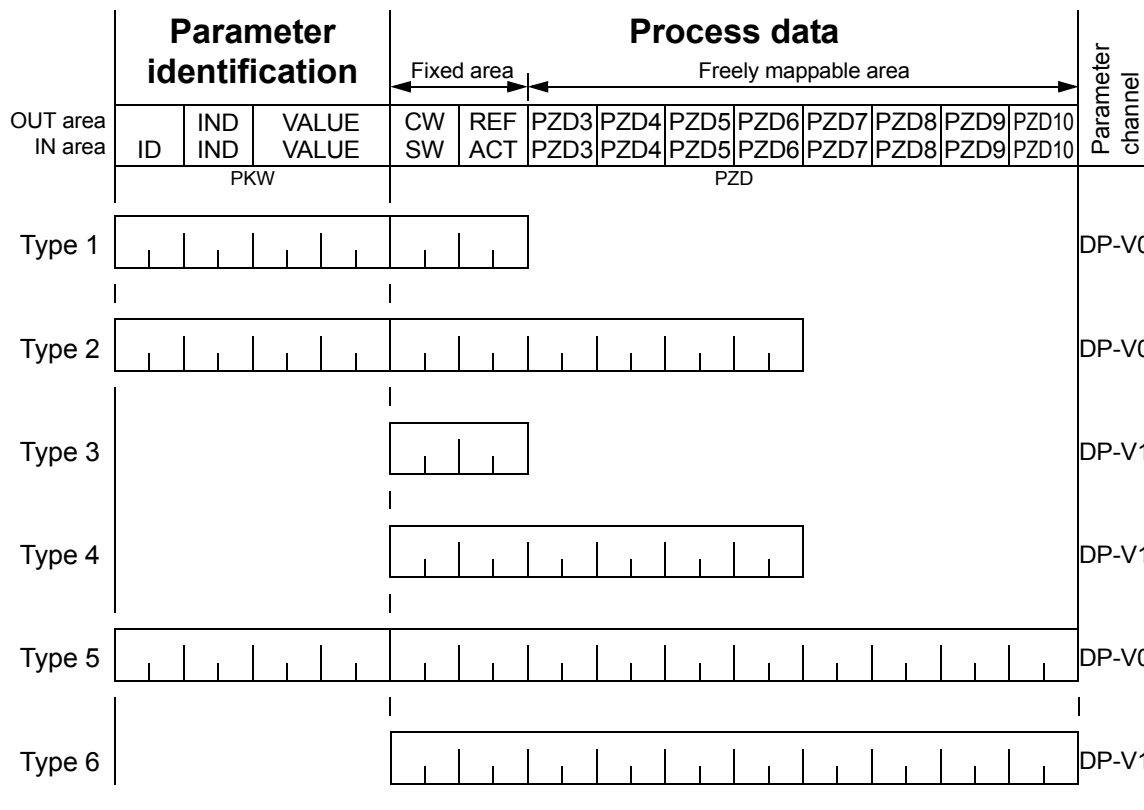
Actual values

Actual values (ACT) are 16/32-bit words containing information on selected operations of the drive.

PPO Types

The PPO (parameter process data object) consists of parameter identification (PKW) and process data (PZD). The PKW is used for reading and writing parameters. The PZD is used for transmitting Control Word, Status Word, Reference values, Actual values and other process data.

The PPO Type 1-6 defines the form of Process data object. Types 1,2 and 5 contain parameter identification (PKW). PPO Type 1-6 defines the length of Process data, the length is 4 bytes at minimum and 20 bytes at maximum.



OUT area – Data sent from Master to Slave (control data)

IN area – Data sent from Slave to Master (actual data)

Parameter Identification:

ID – Parameter Identification

IND – Index for Arrays

VALUE – Parameter Value (Max. 4 bytes)

PKW – Parameter ID/Value

Process Data:

CW – Control Word

SW – Status Word

REF – Reference

ACT – Actual Value

PZD – Process Data (application-specific)

FBA communication profile

The FBA communication profile is a state machine model which describes the general states and state transitions of the drive. The [State diagram](#) on page 20 presents the most important states (including the FBA profile state names). The FBA Control Word (parameter 2.24) commands the transitions between these states and the FBA Status Word (parameter 2.26) indicates the status of the drive.

Fieldbus adapter module profile (selected by adapter module parameter) defines how the control word and status word are transmitted in a system which consists of fieldbus controller, fieldbus adapter module and drive. With transparent modes, control word and status word are transmitted without any conversion between the fieldbus controller and the drive. With other profiles (e.g. PROFIdrive for FPBA-01 and ABB Drives profile for all fieldbus adapter modules) fieldbus adapter module converts the fieldbus-specific control word to the FBA communication profile and status word from FBA communication profile to the fieldbus-specific status word.

Fieldbus references and scaling

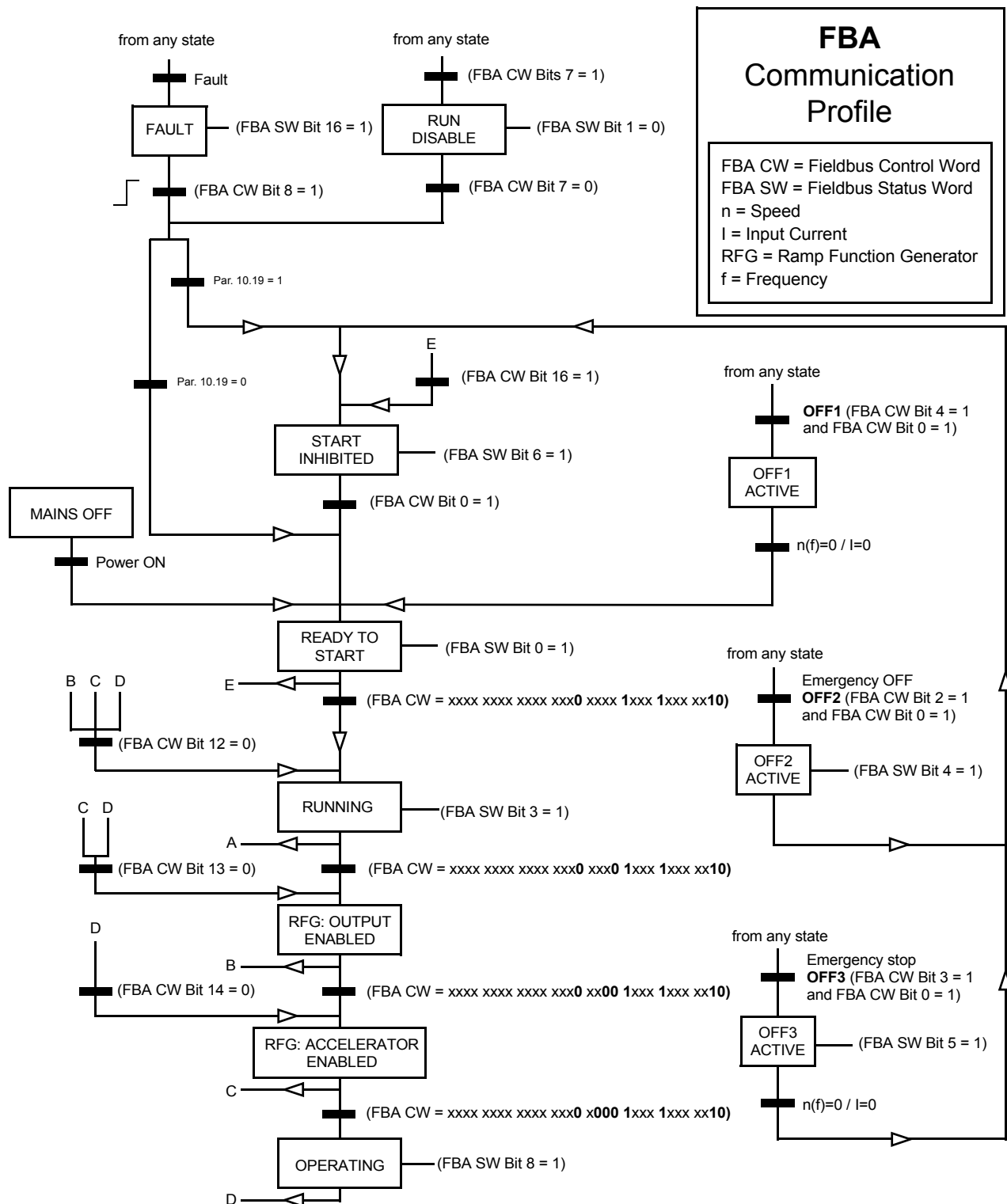
References (FBA REF) are 16/32-bit signed integers. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference value. The contents of each reference word can be used as speed or torque reference. The 32-bit reference value consists of a 16-bit integer value and a 16-bit fractional value.

When speed or torque reference scaling is selected (by parameter 50.04 FBA REF1 MODESEL / 50.05 FBA REF2 MODESEL), the fieldbus references are 16- or 32-bit integers. In the table below, FBA REF denotes either the drive parameter 2.26 FBA MAIN REF1 or the parameter 2.27 FBA MAIN REF2. The speed/torque reference scaling is as follows:

Reference	Scaling	Notes
Speed reference	FBA REF / 65536 (value in rpm)	Final reference is limited by parameters 20.01 MAXIMUM SPEED, 20.02 MINIMUM SPEED and 21.09 SPEED REFMIN ABS.
Torque reference	FBA REF/ 65536 (value in%)	Final reference is limited by torque limit parameters 20.06 ... 20.10

State diagram

The following presents the state diagram for the FBA communication profile.



Communication profiles

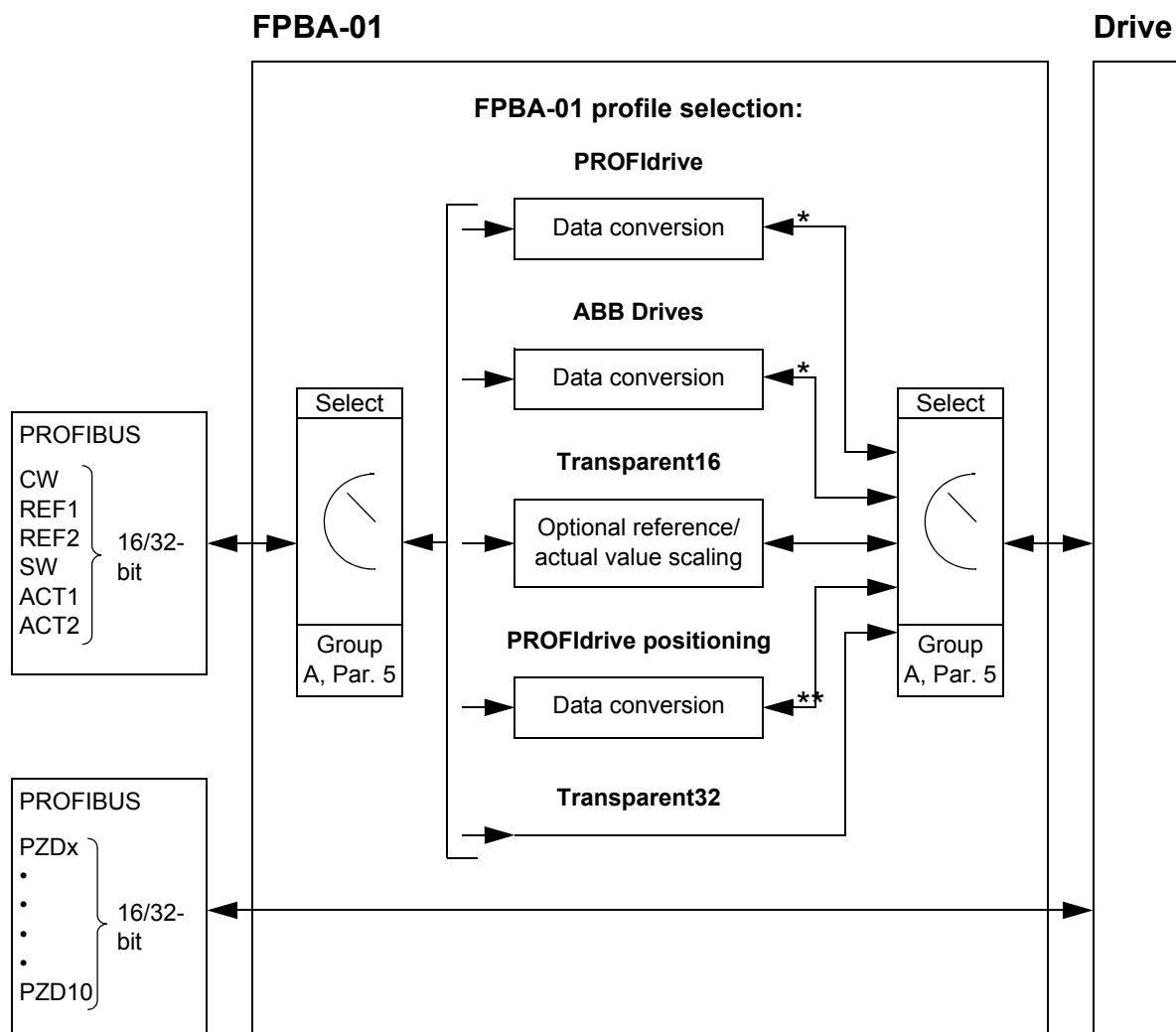
Overview

This chapter describes the communication profiles used in the communication between the PROFIBUS network, the FPBA-01 module, and the drive.

Communication profiles

Communication profiles are ways of transmitting control commands (Control word, Status word, references and actual values) between the master station (PLC) and the slave station (Drive).

With the FPBA-01 module, the PROFIBUS network may employ either the PROFIdrive profile or the ABB Drives profile. Both are converted to the FBA profile (see chapter [Fieldbus control description](#)) by the FPBA-01 module. In addition, two Transparent modes – for 16-bit and 32-bit words are available. With the Transparent modes, no data conversion takes place.



Note: The diagram is applicable only when PPO messaging is used. If Standard Telegrams (ST) are used, the communication profile is selected automatically.

*FBA profile

**PROFdrive positioning is not supported by ACS850

The following sections describe the Control word, the Status word, references and actual values for the PROFdrive and ABB Drives communication profiles. See [FBA communication profile](#) on page 21 for more information on the FBA communication profile.

The PROFIdrive communication profile

The Control Word and the Status Word

The Control Word (PROFIBUS Parameter 967) is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station (PLC) to the drive through the adapter module. The drive switches between its states according to the bit-coded instructions on the Control Word, and returns status information to the master in the Status Word (PROFIBUS Parameter 968).

The contents of the Control Word and the Status Word are detailed in the tables below. The meaning of vendor-specific bits is defined by the drive application program. The drive states are presented in [The general PROFIBUS state machine for all operating modes](#), page 30.

References and scaling

ABB drives can receive control information from multiple sources including analogue and digital inputs, the drive control panel and a communication module (e.g. FPBA-01). In order to have the drive controlled through PROFIBUS, the communication module must be defined as the source for control information, e.g. Reference. See pages from 14 to 17 for the drive parametrization.

References in speed control mode

In the speed control mode, references are 16-bit or 32-bit words containing a sign bit and a 15-bit or 31-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference. The 32-bit reference value consists of a 16-bit integer value and a 16-bit fractional value.

A 16-bit speed reference (REF or NSOLL_A) in hexadecimal (0 ... 4000h) corresponds to 0 ... 100% of maximum reference. The speed scaling is defined by the drive parameter 19.01.

For example: to set the PROFIdrive communication profile scaling ratio 1:1. The drive parameter 19.01 is set to 16384 (4000h).

A 32-bit speed reference (NSOLL_B) in hexadecimal (0 ... 4000 0000h) corresponds to 0 ... 100% of maximum reference (as defined by the drive parameter).

References in torque control mode

References are 16-bit words containing a sign bit and a 15-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

A 16-bit torque reference in hexadecimal (0 ... 4000h) corresponds to 0 ... 100% of maximum reference. The torque scaling is defined by the drive parameter 24.05.

Actual values and scaling

Actual values are 16-bit or 32-bit words containing information on the operation of the drive. The parameters to be monitored are selected by a drive parameter. See

[Setting up communication through a FPBA-01 fieldbus adapter module](#) on page 14 for the drive parametrization.

Actual values in speed control mode

The scaling of 16-bit actual speed values (ACT or NIST_A) in hexadecimal (0...4000h) corresponds to 0...100% maximum reference. The speed scaling is defined by the drive parameter 19.01.

Example: to set the PROFIdrive communication profile scaling ratio 1:1. The drive parameter 19.01 is set to 16384 (4000h).

The scaling of 32-bit actual speed values (NIST_B) in hexadecimal (0...4000 0000h) corresponds to 0...100% of maximum reference (as defined by the drive parameter 19.01).

Actual values in torque control mode

The scaling of 16-bit actual torque values in hexadecimal (0 ... 4000h) corresponds to 0...100% maximum reference. The torque scaling is defined by the drive parameter 24.05.

The Control Word for the PROFIdrive communication profile

The upper case boldface text refers to the states shown on page 30.

Bit	Name	Value	Proceed to STATE/Description
			Speed control mode
0	ON	1	Proceed to READY TO OPERATE .
	OFF1	0	Emergency OFF, stop by the selected deceleration ramp. Proceed to OFF1 ACTIVE ; proceed further to READY TO SWITCH ON unless other interlocks (OFF2, OFF3) are active.
1	OFF2	1	Continue operation (OFF2 inactive).
		0	Emergency OFF, coast to stop. Proceed to OFF2 ACTIVE ; proceed further to SWITCH-ON INHIBIT .
2	OFF3	1	Continue operation (OFF3 inactive).
		0	Emergency stop, stop according to fastest possible deceleration mode. Proceed to OFF3 ACTIVE ; proceed further to SWITCH-ON INHIBIT . Warning! Ensure that the motor and driven machine can be stopped using this stop mode.
3	OPERATION_ENABLE	1	Proceed to ENABLE OPERATION .
		0	Inhibit operation. Proceed to OPERATION INHIBIT .
4	ENABLE_RAMP_GENERATOR or TRAVERSING_TASK	1	Normal operation. Proceed to RAMP FUNCTION GENERATOR: ENABLE OUTPUT .
		0	Stop according to selected stop type.
5		1	Normal operation. Proceed to RAMP FUNCTION GENERATOR: ENABLE ACCELERATOR .
		0	Halt ramping (Ramp Function Generator output held).
6		1	Normal operation. Proceed to OPERATING . Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Force Ramp Function Generator input to zero.
7	RESET	0 ⇒ 1	Fault reset if an active fault exists. Proceed to SWITCH-ON INHIBIT . Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	(Continue normal operation)
8	JOGGING_1		Jogging 1. (Not supported by all drive types)
9	JOGGING_2		Jogging 2. (Not supported by all drive types)
10	REMOTE_CMD	1	Fieldbus control enabled.
		0	Control Word <> 0 or Reference <> 0: Retain last Control Word and Reference. Control Word = 0 and Reference = 0: Fieldbus control enabled.

Bit	Name	Value	Proceed to STATE/Description
			Speed control mode
11		1	Vendor-specific bit as defined by PROFIdrive parameter 933.
		0	
12			Vendor-specific bit as defined by PROFIdrive parameter 934.
13			Vendor-specific bit as defined by PROFIdrive parameter 935.
14			Vendor-specific bit as defined by PROFIdrive parameter 936.
15			Vendor-specific bit as defined by PROFIdrive parameter 937.

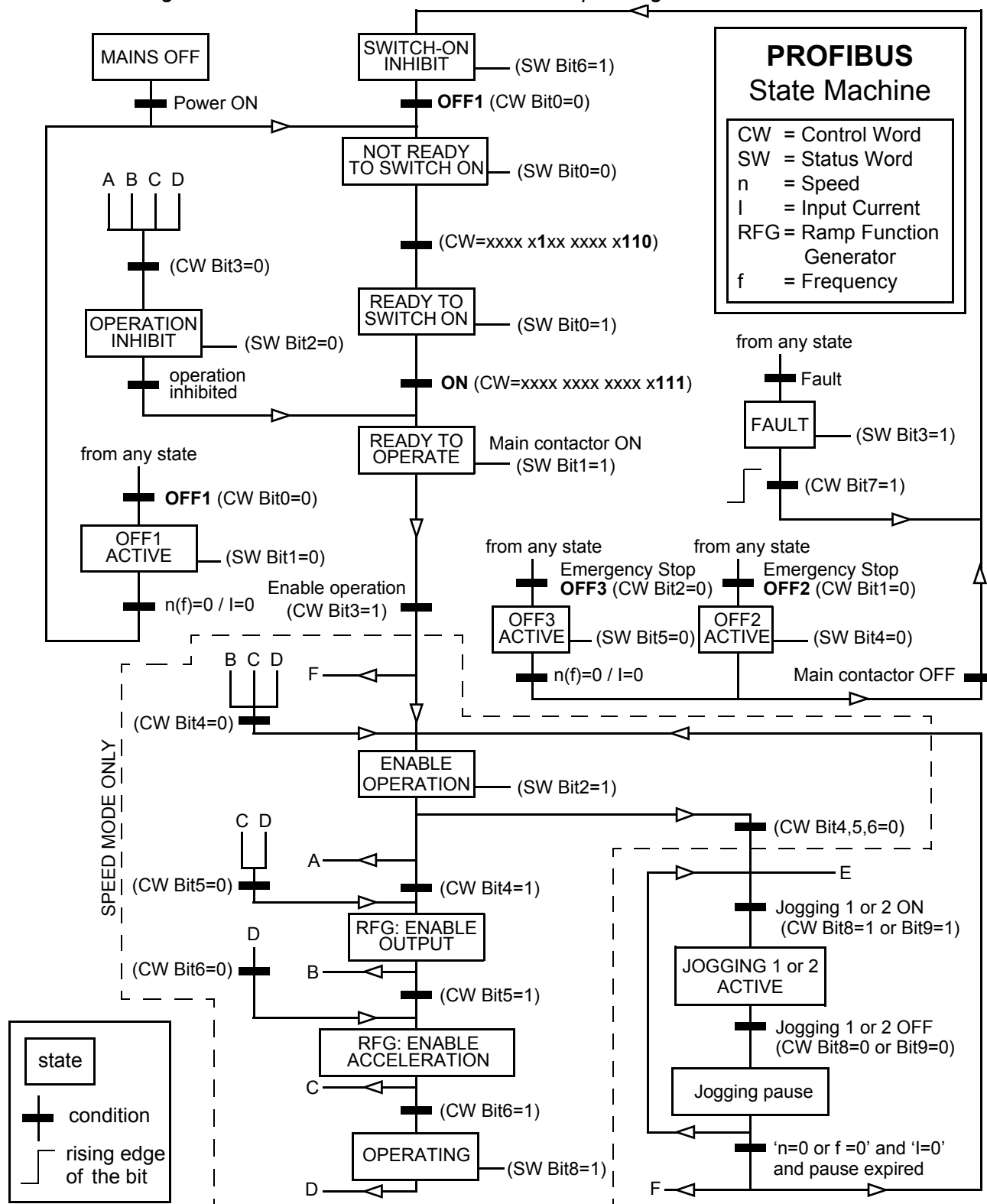
The Status Word for the PROFIdrive communication profile

The upper case boldface text refers to the states shown on page [30](#)

Bit	Name	Value	STATE/Description
			Speed control mode
0	RDY_ON	1	READY TO SWITCH ON.
		0	NOT READY TO SWITCH ON.
1	RDY_RUN	1	READY TO OPERATE.
		0	OFF1 ACTIVE.
2	RDY_REF	1	ENABLE OPERATION.
		0	Disable operation.
3	TRIPPED	1	FAULT.
		0	No fault.
4	OFF_2_STA	1	OFF2 inactive.
		0	OFF2 ACTIVE.
5	OFF_3_STA	1	OFF3 inactive.
		0	OFF3 ACTIVE.
6	SWC_ON_INHIB	1	SWITCH-ON INHIBIT active.
		0	SWITCH-ON INHIBIT not active.
7	ALARM	1	Warning/Alarm.
		0	No Warning/Alarm.
8	AT_SETPOINT	1	OPERATING. Actual value equals reference value (i.e. is within tolerance limits).
		0	Actual value differs from reference value (= is outside tolerance limits).

Bit	Name	Value	STATE/Description
			Speed control mode
9	REMOTE	1	Drive control location: REMOTE.
		0	Drive control location: LOCAL.
10		1	Actual frequency or speed value equals or is greater than supervision limit.
		0	Actual frequency or speed value is within supervision limit.
11		1	Vendor-specific bit as defined by PROFIdrive parameter 939.
		0	
12			Vendor-specific bit as defined by PROFIdrive parameter 940.
13			Vendor-specific bit as defined by PROFIdrive parameter 941.
14			Vendor-specific bit as defined by PROFIdrive parameter 942.
15			Vendor-specific bit as defined by PROFIdrive parameter 943.

The general PROFIBUS state machine for all operating modes



The ABB Drives communication profile

The Control Word and the Status Word

The Control Word is the principal means for controlling the drive from a fieldbus system. It is sent by the fieldbus master station to the drive through the adapter module. The drive switches between its states according to the bit-coded instructions on the Control Word, and returns status information to the master in the Status Word.

The contents of the Control Word and the Status Word are detailed in [The Control Word for the PROFIdrive communication profile](#) and [The Status Word for the PROFIdrive communication profile](#). The drive states are presented in [The general PROFIBUS state machine for all operating modes](#).

References and scaling

ABB drives can receive control information from multiple sources including analogue and digital inputs, the drive control panel and a communication module (e.g. FPBA-01). In order to have the drive controlled through the fieldbus, the module must be defined as the source for control information, e.g. Reference. See [Setting up communication through a FPBA-01 fieldbus adapter module](#) on page 14 for the drive parametrization.

References and scaling in speed control mode

References are 16-bit words containing a sign bit and a 15-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

A 16-bit speed reference in decimal (0 ... 20000) corresponds to 0 ... 100% of maximum reference. The speed scaling is defined by the drive parameter 19.01.

Example: to set the ABB Drives profile scaling ratio 1:1. The drive parameter 19.01 is set to 20000 (4E20h).

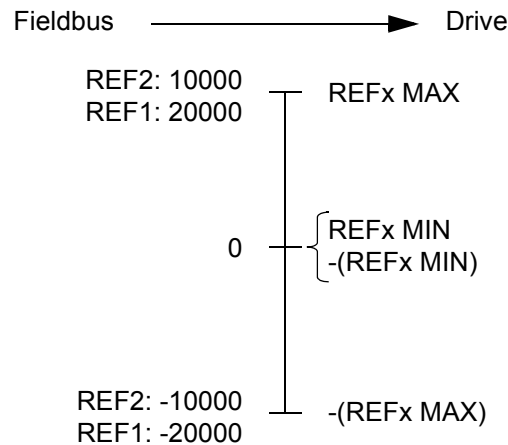
References and scaling in torque control mode

References are 16-bit words containing a sign bit and a 15-bit integer. A negative reference (indicating reversed direction of rotation) is formed by calculating the two's complement from the corresponding positive reference.

A 16-bit torque reference in decimal (0...10000) corresponds to 0...100% of maximum reference. The torque scaling is defined by the drive parameter 24.05.

References are scaled as shown below.

Note: The scaling values of REF1 MAX and REF2 MAX for speed and torque are set by drive parameters 19.01 and 24.05, respectively.



Actual values and scaling

Actual values are 16-bit words that contain information on the operation of the drive. The functions to be monitored are selected by a drive parameter, see [Setting up communication through a FPBA-01 fieldbus adapter module](#) on page 14 for the drive parametrization.

Actual values in speed control mode

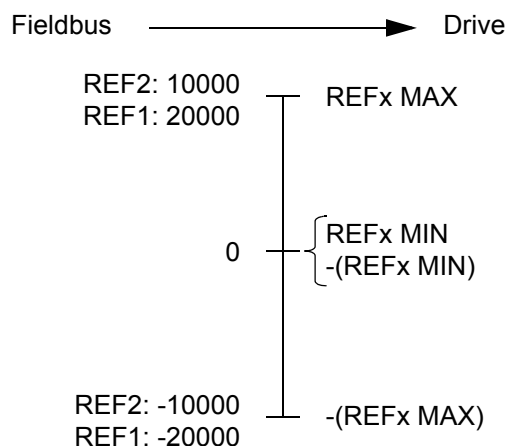
The scaling of 16-bit actual speed values in decimal (0...20000) corresponds to 0 ... 100% maximum reference. The speed scaling is defined by the drive parameter 19.01.

For example: to set the ABB Drives profile scaling ratio 1:1. The drive parameter 19.01 is set to 20000 (4E20h).

Actual values in torque control mode

The scaling of 16-bit actual torque values in decimal (0...10000) corresponds to 0...100% of maximum reference. The torque scaling is defined by the drive parameter 24.05.

Note: The scaling values of REF1 MAX and REF2 MAX for speed and torque are set by drive parameters 19.01 and 24.05 respectively.



The Control Word for the ABB Drives communication profile.

The upper case boldface text refers to the states shown in [State machine, ABB Drives communication profile](#).

Bit	Name	Value	STATE/Description
0	OFF1_ CONTROL	1	Proceed to READY TO OPERATE .
		0	Stop along currently active deceleration ramp. Proceed to OFF1 ACTIVE ; proceed to READY TO SWITCH ON unless other interlocks (OFF2, OFF3) are active.
1	OFF2_ CONTROL	1	Continue operation (OFF2 inactive).
		0	Emergency OFF, coast to stop. Proceed to OFF2 ACTIVE , proceed to SWITCH-ON INHIBITED .
2	OFF3_ CONTROL	1	Continue operation (OFF3 inactive).
		0	Emergency stop, stop within time defined by drive parameter. Proceed to OFF3 ACTIVE ; proceed to SWITCH-ON INHIBITED . Warning! Ensure that the motor and driven machine can be stopped using this stop mode.
3	INHIBIT_ OPERATION	1	Proceed to OPERATION ENABLED . Note: Run enable signal must be active; see drive documentation. If the drive is set to receive the Run enable signal from the fieldbus, this bit activates the signal.
		0	Inhibit operation. Proceed to OPERATION INHIBITED .
4	RAMP_OUT_ ZERO	1	Normal operation. Proceed to RAMP FUNCTION GENERATOR: OUTPUT ENABLED .
		0	Force Ramp Function Generator output to zero. Drive ramps to stop (current and DC voltage limits in force).

Bit	Name	Value	STATE/Description
5	RAMP_HOLD	1	Enable ramp function. Proceed to RAMP FUNCTION GENERATOR: ACCELERATOR ENABLED .
		0	Halt ramping (Ramp Function Generator output held).
6	RAMP_IN_ZERO	1	Normal operation. Proceed to OPERATING . Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Force Ramp Function Generator input to zero.
7	RESET	0=>1	Fault reset if an active fault exists. Proceed to SWITCH-ON INHIBITED . Note: This bit is effective only if the fieldbus interface is set as the source for this signal by drive parameters.
		0	Continue normal operation.
8 to 9	Reserved.		
10	REMOTE_CMD	1	Fieldbus control enabled.
		0	Control Word <> 0 or Reference <> 0: Retain last Control Word and Reference. Control Word = 0 and Reference = 0: Fieldbus control enabled. Reference and deceleration/acceleration ramp are locked.
11	EXT_CTRL_LOC	1	Select External Control Location EXT2. Effective if control location parameterised to be selected from fieldbus.
		0	Select External Control Location EXT1. Effective if control location parameterised to be selected from fieldbus.
12 to 15	Drive-specific (For information, see the drive documentation.)		

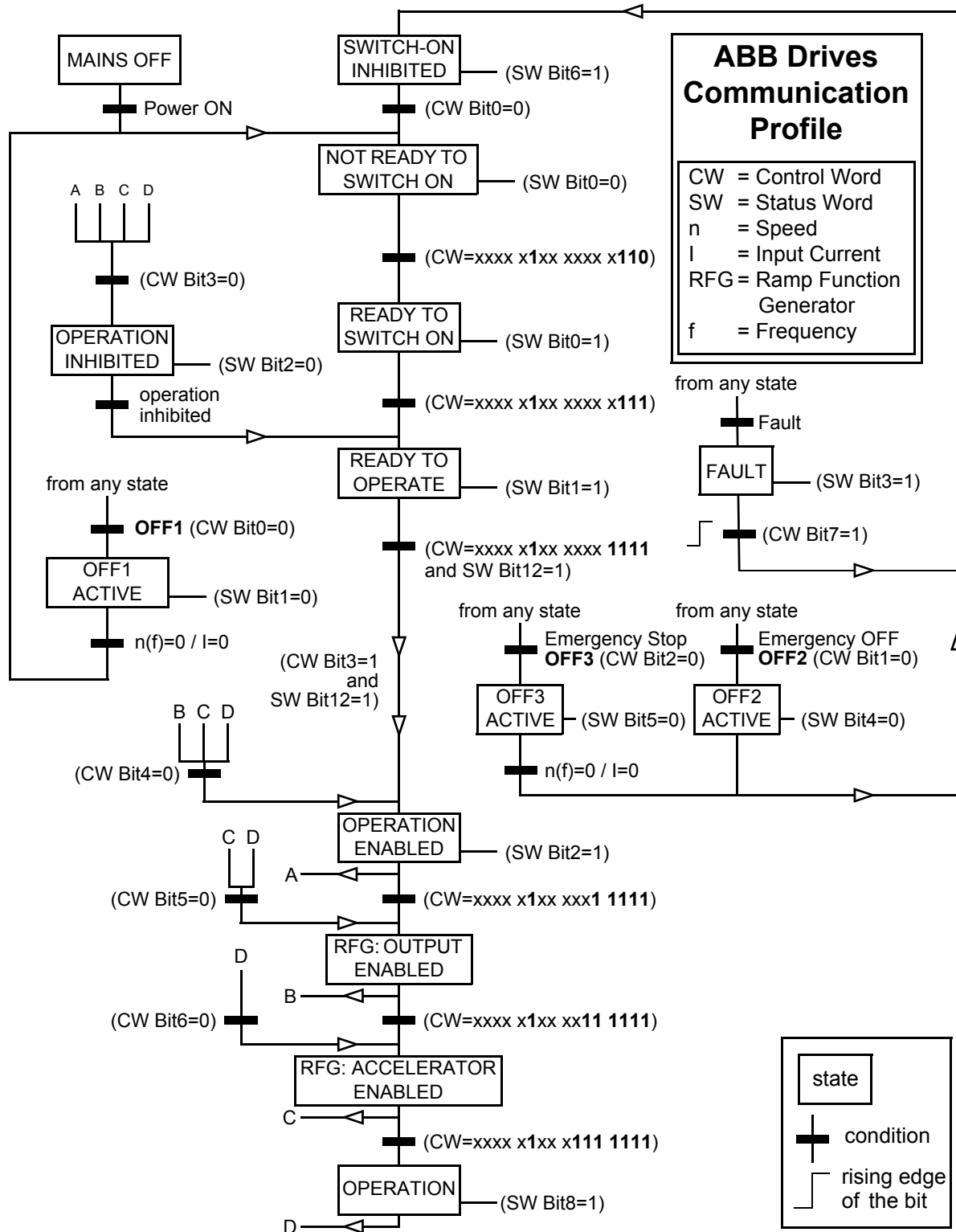
The Status Word for the ABB Drives communication profile.

The upper case boldface text refers to the states shown in [State machine, ABB Drives communication profile](#).

Bit	Name	Value	STATE/Description
0	RDY_ON	1	READY TO SWITCH ON.
		0	NOT READY TO SWITCH ON.
1	RDY_RUN	1	READY TO OPERATE.
		0	OFF1 ACTIVE.
2	RDY_REF	1	OPERATION ENABLED.
		0	Operation inhibited.
3	TRIPPED	1	FAULT.
		0	No fault.
4	OFF_2_STA	1	OFF2 inactive.
		0	OFF2 ACTIVE.

Bit	Name	Value	STATE/Description
5	OFF_3_STA	1	OFF3 inactive.
		0	OFF3 ACTIVE.
6	SWC_ON_INHIB	1	SWITCH-ON INHIBITED
		0	–
7	ALARM	1	Warning/Alarm.
		0	No warning/alarm.
8	AT_SETPOINT	1	OPERATION. Actual value equals reference = is within tolerance limits, i.e. in speed control, speed error is 10% max. of nominal motor speed.
		0	Actual value differs from reference = is outside tolerance limits.
9	REMOTE	1	Drive control location: REMOTE (EXT1 or EXT2).
		0	Drive control location: LOCAL.
10	ABOVE_LIMIT	1	Actual frequency or speed equals or exceeds supervision limit (set by drive parameter). Valid in both directions of rotation.
		0	Actual frequency or speed within supervision limit.
11	EXT_CTRL_LOC	1	External Control Location EXT2 selected.
		0	External Control Location EXT1 selected.
12	EXT_RUN_ENABLE	1	External Run Enable signal received.
		0	No External Run Enable signal received.
13 to 14	Drive-specific (For information, see the drive documentation.)		
15	FBA_ERROR	1	Communication error detected by fieldbus adapter module.
		0	Fieldbus adapter communication OK.

State machine, ABB Drives communication profile



Installation and parameter setup for communication profiles

Overview

This chapter presents the steps to take during the start-up of the FPBA-01 PROFIBUS DP Adapter Module and the ACS850 drive. This chapter presents examples for different applications such as speed and torque control, sending reference over fieldbus and scaling. For more detailed information, see *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English]), *ACS850 Standard Control Program Firmware Manual* (3AUA0000045497 [English]) and appropriate hardware manual, such as *ACS850-04 Drive Modules (1.1 to 45 kW) Hardware Manual* (3AUA0000045496 [English]).



WARNING! Follow the safety instructions given in this manual and in the hardware manual of the drive.

Mechanical and electrical installation

- 1 Insert the FPBA-01 into slot 3 in the drive.
- 2 Fasten the screw.
- 3 Plug and fasten the Profibus DP connector to the module.
- 4 Connect the other end of the profibus cable to a profibus master (PLC).
- 5 Power up the drive
- 6 Power up the profibus master (PLC).

For more detailed information see appropriate User/Hardware manual.

Parameter setup examples

This section gives the recommended drive parameter settings for different communication profiles. For more information on the communication profiles used in the communication between the PROFIBUS network, the FPBA-01 module and the drive, such as the contents of the Control Word and Status Word and the state machines of the profiles, refer to chapters [Fieldbus control description](#) and [Communication profiles](#).

Note: An ID run must be performed before commissioning. For more information see *ACS850 Standard Control Program Firmware Manual* (3AUA0000045497 [English]).

PROFIdrive communication profile (Speed Control Mode) PPO Type 4

The start/stop commands and reference are according to the PROFIdrive profile *Speed Control Mode*. This example employs PPO Type 4 cyclical message. Set parameters as given in the Application-specific setting column in the table below.

A reference value of ± 16384 (4000h) corresponds to parameter 19.01 SPEED SCALING in forward and reverse directions.

Process data mapping is as follows:

Direction	PZD1	PZD2
Out	Control Word	Speed reference
In	Status Word	Speed actual value

Drive control parameters

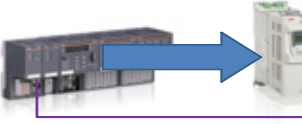
Use DriveStudio PC tool for drive parameter setup. The Application-specific setting column gives the value to use when the fieldbus interface is the desired source or destination for that particular signal. The Function/Information column gives a description of the parameter.

Parameter	Application-specific setting	Function/Information
CONTROL COMMAND SOURCE SELECTION		
		
10.01 EXT1 START FUNC	(3) FBA	EXT1 start and stop commands are taken from the fieldbus.
12.03 EXT1 CTRL MODE	(1) Speed	Speed control. Torque reference is 03.09 TORQ REF SP CTRL.
19.01 SPEED SCALING	1500	Defines the terminal speed value used in acceleration and the initial speed value used in deceleration. Speed reference scaling is defined by the used fieldbus profile (e.g. with PROFIdrive profile integer value 16384 (4000h) corresponds to parameter 19.01 SPEED SCALING value). Signal 01.01 Motor speed rpm is sent to the fieldbus as an actual value.
21.01 SPEED REF1 SEL	FBA ref1	Selects the source for speed reference 1.
SYSTEM CONTROL INPUTS		
16.07 PARAM SAVE	(0) DONE (1) SAVE	Saves parameter value changes (including those made through fieldbus control) to permanent memory.

Fieldbus parameters

The Application-specific setting column is a setup for speed control, using PROFIdrive profile and PPO type 4.

Parameter	Application-specific setting	Function/Information
COMMUNICATION INITIALISATION AND SUPERVISION 		
50.01 FBA ENABLE	(1) ENABLE	Initialises communication between drive and fieldbus adapter module.
50.02 COMM LOSS FUNC	(1) FAULT	Selects how the drive reacts in a fieldbus communication break.
50.03 COMM LOSS T OUT	0.3	Defines the time between communication break detection and the action selected with parameter 50.02 COMM LOSS FUNC.
50.04 FBA REF1 MODESEL	(2) SPEED	Selects the fieldbus reference FBA REF1 scaling and the actual value, which is sent to the fieldbus (FBA ACT1).
FPBA-01 ADAPTER MODULE CONFIGURATION 		
51.01 FBA TYPE	Profibus DP	Displays the type of the fieldbus adapter module.
51.02 NODE NUMBER	2	Each device on the Profibus network must have a unique node number. This parameter is used to define a node number for the drive it is connected to.
51.03 BAUD RATE	12000	Indicates the detected communication speed in kbit/s; 12000 = 12 Mbit/s
51.04 TELEGRAM TYPE	4	Indicates the selected telegram type for the Profibus communication. 4 = PPO Type 4.
51.05 PROFILE	0	Selects which communication profile is used. 0 = PROFIdrive.
51.06 T16 SCALE	0	Reference multiplier/actual value divisor for the FPBA-01. The parameter is only effective when Transparent 16 profile is selected and the drive is using FBA communication profile.
51.27 FBA PAR REFRESH	1	Validates any changed adapter module configuration parameter settings.
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 1 or A for parameters 51.01...51.26.		

Parameter	Application-specific setting	Function/Information
TRANSMITTED DATA SELECTION FROM DRIVE TO PLC 		
52.01 FBA DATA IN1 ... 52.12 FBA DATA IN12		Defines the data transmitted from drive to fieldbus controller and further to the PLC. Parameters are set according to the virtual address area of the drive. Note: If the length of the selected data is 32 bits, two parameters are reserved for the transmission.
52.01 FBA DATA IN1	4	Status word (16-bit). Mapping: PZD1
52.02 FBA DATA IN 2	5	Actual value 1 (16-bit). Mapping: PZD2
TRANSMITTED DATA SELECTION FROM PLC TO DRIVE 		
53.01 FBA DATA OUT 1 ... 53.12 FBA DATA OUT 12		Defines the data transmitted from fieldbus controller to drive. Note: If the length of the selected data is 32 bits, two parameters are reserved for the transmission.
53.01 FBA DATA OUT 1	1	Control word (16-bit). Mapping: PZD1
53.02 FBA DATA OUT 2	2	Reference 1 (16-bit). Mapping: PZD2
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 3 or C for parameters 52.01...52.12 and 2 or B for parameters 53.01...53.12.		
51.27 FBA PAR REFRESH	(1) REFRESH	Validates any changed adapter module configuration parameter settings.

Drive control parameters for the PROFIdrive profile in DriveStudio

10 Start/stop/dir				
1	Ext1 start func	FBA	0	6
2	Ext1 start in1	DI1		
3	Ext1 start in2	C.False		
4	Ext2 start func	FBA	0	6
12 Operating mode				
1	Ext1/Ext2 sel	C.False		
3	Ext1 ctrl mode	Speed	1	5
5	Ext2 ctrl mode	Torque	1	5
7	Local ctrl mode	Speed	1	2
19 Speed calculation				
1	Speed scaling	1500 rpm	0	30000
21 Speed ref				
1	Speed ref1 sel	FBA ref1		
2	Speed ref2 sel	Zero		
3	Speed ref1 func	Ref1	0	5
4	Speed ref1/2 sel	C.False		
5	Speed share	1.000	-8.000	8.000
24 Torque ref				
1	Torq ref1 sel	FBA ref2		
2	Torq ref add sel	Zero		
3	Maximum torq ref	300.0 %	0.0	1000.0
4	Minimum torq ref	-300.0 %	-1000.0	0.0
5	Load share	1.000	-8.000	8.000
50 Fieldbus				
1	Fba enable	Enable	0	1
2	Comm loss func	Fault	0	3
3	Comm loss t out	0.3 s	0.3	6553.5
4	Fba ref1 modesel	Speed	0	2
5	Fba ref2 modesel	Torque	0	2
51 FBA settings				
1	FBA type	Profibus-DP	0	65535
2	FBA par2	2	0	65535
3	FBA par3	12000	0	65535
4	FBA par4	4	0	65535
5	FBA par5	0	0	65535
52 FBA data in				
1	FBA data in1	4	0	9999
2	FBA data in2	5	0	9999
53 FBA data out				
1	FBA data out1	1	0	9999
2	FBA data out2	2	0	9999

51 FBA settings

1 FBA type	Profibus-DP	0	65535
2 FBA par2	2	0	65535
3 FBA par3	12000	0	65535
4 FBA par4	4	0	65535
5 FBA par5	0	0	65535
6 FBA par6	0	0	65535
7 FBA par7	0	0	65535
8 FBA par8	0	0	65535
9 FBA par9	0	0	65535
10 FBA par10	0	0	65535
11 FBA par11	0	0	65535
12 FBA par12	0	0	65535
13 FBA par13	0	0	65535
14 FBA par14	0	0	65535
15 FBA par15	0	0	65535
16 FBA par16	0	0	65535
17 FBA par17	0	0	65535
18 FBA par18	0	0	65535
19 FBA par19	0	0	65535
20 FBA par20	0	0	65535
21 FBA par21	0	0	65535
22 FBA par22	0	0	65535
23 FBA par23	0	0	65535
24 FBA par24	0	0	65535
25 FBA par25	0	0	65535
26 FBA par26	0	0	65535
27 FBA par refresh	DONE	0	1
28 Par table ver	DONE	0x0000	0xFFFF
29 Drive type code	REFRESH	0	65535

16 System

1 Local lock	C.False		
2 Parameter lock	Open	0	2
3 Pass code	0	0	21474836...
4 Param restore	Done	0	2
7 Param save	Done	0	1
9 User set sel	Done	1	10
10 User set log	Save	0	42949672...

The Control Word is used for sending commands from a master (PLC) to a slave unit (Drive). Control Word and Status Word can be monitored from the PLC. The start sequence for this example is given in the table below.

Step	Instruction	Control Word (Hex)	Operation	Status Word
1	Power up	0x0000	Fault active	0x0338
2	Reset fault (bit 7) Remote command (bit 10)	0x0480	Reset fault	0x0380
3	OFF2 inactive (bit 1) OFF3 inactive (bit 2) Operation enabled (bit 3) Enable ramp function generator (bit 4) Enable ramp function (bit 5) Force ramp function generator input to zero inactive (bit 6) Remote command (bit 10)	0x047e	OFF1 active Ready to switch on	0x0331
4	Ready to operate (bit 0) OFF2 inactive (bit 1) OFF3 inactive (bit 2) Operation enable (bit 3) Enable ramp function generator (bit 4) Enable ramp function (bit 5) Force ramp function generator input to zero inactive (bit 6) Remote command (bit 10)	0x047f	Operating Drive starts to modulate	0x0337
5	Set speed reference value to 200	0x047f	Motor runs at reference speed	0x0337

ABB DRIVES communication profile (Speed/Torque Control Mode) with PPO Type 5

The start/stop commands and reference are according to the ABB DRIVES profile Speed Control Mode.

When Reference 1 (REF1) is used, a reference value of ± 20000 (4E20h) corresponds to 0 ... 100% of maximum reference. The speed scaling is defined by the drive parameter 19.01 in the forward and reverse directions.

When Reference 2 (REF2) is used, a reference value of ± 10000 (2710h) corresponds to 0 ... 100% of maximum reference. The torque scaling is defined by the drive parameter 24.05 in the forward and reverse directions.

Direction	PZD1	PZD2	PZD3	PZD4	PZD5	PZD6
Out	Control Word	Speed reference	Torque reference	Not used		
In	Status Word	Speed actual value	Torque actual	Not used		

Drive control parameters

The setup of Application-specific setting column gives the parameter values to use when the fieldbus interface is the desired source or destination for that particular signal. The Function/Information column gives a description of the parameter.

Parameter	Application-specific setting	Function/Information
CONTROL COMMAND SOURCE SELECTION		
		
10.01 EXT1 START FUNC	(3) FBA	EXT1 start and stop commands are taken from the fieldbus.
10.04 EXT2 START FUNC	(3) FBA	EXT2 start and stop commands are taken from the fieldbus
12.01 EXT1/EXT2 SEL	C.false	External 1 / External 2 selection from fieldbus only (bit in the fieldbus Control Word)
12.03 EXT1 CTRL MODE	(1) Speed	Speed control. Torque reference is 03.09 TORQ REF SP CTRL.
12.05 EXT2 CTRL MODE	(2) Torque	Torque control. Torque reference is 03.12 TORQ REF SP LIM.
19.01 SPEED SCALING	1500	Defines the terminal speed value used in acceleration and the initial speed value used in deceleration. Speed reference scaling is defined by the used fieldbus profile (e.g. with ABB Drives profile integer value 20000 (4E20h) corresponds to parameter 19.01 SPEED SCALING value). Signal 01.01 MOTOR SPEED RPM is sent to the fieldbus as an actual value.
21.01 SPEED REF1 SEL	FBA ref1	Selects the source for speed reference 1.
24.01 TORQUE REF1 SEL	FBA ref2	Selects the source for torque reference 1.
SYSTEM CONTROL INPUTS		
16.07 PARAM SAVE	(0) DONE (1) SAVE	Saves parameter value changes (including those made through fieldbus control) to permanent memory.

Fieldbus parameters

The Application-specific setting column is a setup for speed/torque control, using ABB drives profile and PPO type 5.

Parameter	Application-specific setting	Function/Information
COMMUNICATION INITIALISATION AND SUPERVISION 		
50.01 FBA ENABLE	(1) ENABLE	Initialises communication between drive and fieldbus adapter module.
50.02 COMM LOSS FUNC	(1) FAULT	Selects how the drive reacts in a fieldbus communication break.
50.03 COMM LOSS T OUT	0.3	Defines the time between communication break detection and the action selected with parameter 50.02 COMM LOSS FUNC.
50.04 FBA REF1 MODESEL	(2) SPEED	Selects the fieldbus reference FBA REF1 scaling and the actual value, which is sent to the fieldbus (FBA ACT1). ABB Drives Profile integer value 20000 corresponds to parameter 19.01 SPEED SCALING value. Signal 01.01 Motor speed rpm is sent to the fieldbus as an actual value.
50.05 FBA REF2 MODESEL	(1) TORQUE	Selects the fieldbus reference FBA REF2 scaling and the actual value, which is sent to the fieldbus (FBA ACT2). ABB Drives Profile integer value 10000 corresponds to 100% torque value. Signal 01.06 Motor torque is sent to the fieldbus as an actual value.
FPBA-01 ADAPTER MODULE CONFIGURATION 		
51.01 FBA TYPE	Profibus DP	Displays the type of the fieldbus adapter module.
51.02 NODE NUMBER	2	Each device on the Profibus network must have a unique node number. This parameter is used to define a node number for the drive it is connected to.
51.03 BAUD RATE	12000	This parameter indicates the detected communication speed in kbit/s; 12000 = 12 Mbit/s
51.04 TELEGRAM TYPE	5	This parameter indicates the selected telegram type for the Profibus communication. 5 = PPO Type 5.
51.05 PROFILE	1	This parameter is used to select which communication profile is used. 1 = ABB Drives profile.

Parameter	Application-specific setting	Function/Information
51.06 T16 SCALE	0	Reference multiplier/actual value divisor for the FPBA-01. The parameter is only effective when Transparent 16 profile is selected and the drive is using FBA communication profile.
51.27 FBA PAR REFRESH	1	Validates any changed adapter module configuration parameter settings.
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 1 or A for parameters 51.01...51.26.		
TRANSMITTED DATA SELECTION FROM DRIVE TO PLC 		
52.01 FBA DATA IN1 ... 52.12 FBA DATA IN12		Defines the data transmitted from drive to fieldbus controller and further to the PLC. Parameters are set according to the virtual address area of the drive. Note: If the length of the selected data is 32 bits, two parameters are reserved for the transmission.
52.01 FBA DATA IN1	4	Status word (16-bit). Mapping: PZD1
52.02 FBA DATA IN 2	5	Actual value 1 (16-bit). Mapping: PZD2
52.03 FBA DATA IN 3	6	Actual value 2 (16-bit). Mapping: PZD3
TRANSMITTED DATA SELECTION FROM PLC TO DRIVE 		
53.01 FBA DATA OUT 1 ... 53.12 FBA DATA OUT 12		Defines the data transmitted from fieldbus controller to drive. Note: If the length of the selected data is 32 bits, two parameters are reserved for the transmission.
53.01 FBA DATA OUT 1	1	Control word (16-bit). Mapping: PZD1
53.02 FBA DATA OUT 2	2	Reference 1 (16-bit). Mapping: PZD2
53.03 FBA DATA OUT 3	3	Reference 2 (16-bit). Mapping: PZD3
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 3 or C for parameters 52.01...52.12 and 2 or B for parameters 53.01...53.12.		
51.27 FBA PAR REFRESH	(1) REFRESH	Validates any changed adapter module configuration parameter settings.

Drive control parameters for the ABB Drives profile in DriveStudio

10 Start/stop/dir				
1	Ext1 start func	FBA	0	6
2	Ext1 start in1	DI1		
3	Ext1 start in2	C.False		
4	Ext2 start func	FBA	0	6
12 Operating mode				
1	Ext1/Ext2 sel	C.False		
3	Ext1 ctrl mode	Speed	1	5
5	Ext2 ctrl mode	Torque	1	5
7	Local ctrl mode	Speed	1	2
19 Speed calculation				
1	Speed scaling	1500 rpm	0	30000
21 Speed ref				
1	Speed ref1 sel	FBA ref1		
2	Speed ref2 sel	Zero		
3	Speed ref1 func	Ref1	0	5
4	Speed ref1/2 sel	C.False		
5	Speed share	1.000	-8.000	8.000
24 Torque ref				
1	Torq ref1 sel	FBA ref2		
2	Torq ref add sel	Zero		
3	Maximum torq ref	300.0 %	0.0	1000.0
4	Minimum torq ref	-300.0 %	-1000.0	0.0
5	Load share	1.000	-8.000	8.000
50 Fieldbus				
1	Fba enable	Enable	0	1
2	Comm loss func	Fault	0	3
3	Comm loss t out	0.3 s	0.3	6553.5
4	Fba ref1 modesel	Speed	0	2
5	Fba ref2 modesel	Torque	0	2
51 FBA settings				
1	FBA type	Profibus-DP	0	65535
2	FBA par2	2	0	65535
3	FBA par3	12000	0	65535
4	FBA par4	5	0	65535
5	FBA par5	1	0	65535
52 FBA data in				
1	FBA data in1	4	0	9999
2	FBA data in2	5	0	9999
3	FBA data in3	6	0	9999
53 FBA data out				
1	FBA data out1	1	0	9999
2	FBA data out2	2	0	9999
3	FBA data out3	3	0	9999

51 FBA settings

1 FBA type	Profibus-DP	0	65535
2 FBA par2	2	0	65535
3 FBA par3	12000	0	65535
4 FBA par4	5	0	65535
5 FBA par5	1	0	65535
6 FBA par6	1500	0	65535
7 FBA par7	0	0	65535
8 FBA par8	0	0	65535
9 FBA par9	0	0	65535
10 FBA par10	0	0	65535
11 FBA par11	0	0	65535
12 FBA par12	0	0	65535
13 FBA par13	0	0	65535
14 FBA par14	0	0	65535
15 FBA par15	0	0	65535
16 FBA par16	0	0	65535
17 FBA par17	0	0	65535
18 FBA par18	0	0	65535
19 FBA par19	0	0	65535
20 FBA par20	0	0	65535
21 FBA par21	0	0	65535
22 FBA par22	0	0	65535
23 FBA par23	0	0	65535
24 FBA par24	0	0	65535
25 FBA par25	0	0	65535
26 FBA par26	0	0	65535
27 FBA par refresh	DONE	0	1
28 Par table ver	DONE	0x0000	0xFFFF
29 Drive type code	REFRESH	0	65535

16 System

1 Local lock	C.False		
2 Parameter lock	Open	0	2
3 Pass code	0	0	21474836...
4 Param restore	Done	0	2
7 Param save	Done	0	1
9 User set sel	Done	1	10
10 User set log	Save	0	42949672...

The Control Word is used for sending commands from a master (PLC) to a slave unit (Drive). The start sequence for **speed control** in this example is given in the table below.

Step	Instruction	Control Word (Hex)	Operation	Status Word
1	Power up	0x0000	Fault active	0x1338
2	Reset fault (bit 7) Remote command (bit 10)	0x0480	Reset fault	0x0380
3	OFF2 inactive (bit 1) OFF3 inactive (bit 2) Operation enabled (bit 3) Enable ramp function generator (bit 4) Enable ramp function (bit 5) Force ramp function generator input to zero inactive (bit 6) Remote command (bit 10)	0x047e	OFF1 active Ready to operate	0x1331
4	OFF1 inactive (bit 0) OFF2 inactive (bit 1) OFF3 inactive (bit 2) Operation enable (bit 3) Enable ramp function generator (bit 4) Enable ramp function (bit 5) Force ramp function generator input to zero inactive (bit 6) Remote command (bit 10)	0x047f	Operating Drive starts to modulate	0x1337
5	Set speed reference value to 200	0x047f	Motor runs at reference speed	0x1337

The start sequence for **torque control** in this example is given in the table below.

Step	Instruction	Control Word (Hex)	Operation	Status Word
1	Power up	0x0000	Fault active	0x1338
2	Reset fault (bit 7) Remote command (bit 10) External control location EXT2 selected (bit 11)	0x0c80	Reset fault External 2 for torque control selected	0x0b80
3	OFF2 inactive (bit 1) OFF3 inactive (bit 2) Operation enabled (bit 3) Remote command (bit 10) External control location EXT2 selected (bit 11)	0x0c0e	Ready to operate	0x1b31
4	Ready to operate (bit 0) OFF2 inactive (bit 1) OFF3 inactive (bit 2) Operation enabled (bit 3) Remote command (bit 10) External control location EXT2 selected (bit 11)	0x0c0f	Operating Drive starts to modulate	0x1b37
5	Set torque reference value to 2000 (Equals to 20.00%).	0x0c0f	Motor runs at reference torque. If speed limit is met, motor runs at 3.12 TORQ REF SP LIM to prevent motor rush	0x1a37

Transparent16 communication profile (Speed Control Mode) PPO Type 5

The start/stop commands and reference are according to the Transparent16 control mode. This example employs cyclical message type; PPO Type 5. Set parameters as given in the Application-specific setting column in the table below.

A reference value of 0 to 65536 corresponds to parameter 51.06 T16 SCALE.

Process data mapping is as follows:

Direction	PZD1	PZD2
Out	Control Word	Speed reference
In	Status Word	Speed actual value

Drive control parameters

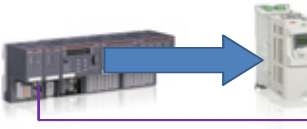
The setup of Application-specific setting column gives the value to use when the fieldbus interface is the desired source or destination for that particular signal. The Function/Information column gives a description of the parameter.

Parameter	Application-specific setting	Function/Information
CONTROL COMMAND SOURCE SELECTION		
		
10.01 EXT1 START FUNC	(3) FBA	EXT1 start and stop commands are taken from the fieldbus.
12.03 EXT1 CTRL MODE	(1) Speed	Speed control. Torque reference is 03.09 TORQ REF SP CTRL.
19.01 SPEED SCALING	1500	Defines the terminal speed value used in acceleration and the initial speed value used in deceleration. Speed reference scaling is defined by the used fieldbus profile (e.g. with PROFIdrive profile integer value 16384 (4000h) corresponds to parameter 19.01 SPEED SCALING value). Signal 01.01 Motor speed rpm is sent to the fieldbus as an actual value.
21.01 SPEED REF1 SEL	FBA ref1	Selects the source for speed reference 1.
SYSTEM CONTROL INPUTS		
16.07 PARAM SAVE	(0) DONE (1) SAVE	Saves parameter value changes (including those made through fieldbus control) to permanent memory.

Fieldbus parameters

The Application-specific setting column is a setup for speed control, using T16 profile and PPO type 5.

Parameter	Application-specific setting	Function/Information
COMMUNICATION INITIALISATION AND SUPERVISION 		
50.01 FBA ENABLE	(1) ENABLE	Initialises communication between drive and fieldbus adapter module.
50.02 COMM LOSS FUNC	(1) FAULT	Selects how the drive reacts in a fieldbus communication break.
50.03 COMM LOSS T OUT	0.3	Defines the time between communication break detection and the action selected with parameter 50.02 COMM LOSS FUNC.
50.04 FBA REF1 MODESEL	(2) SPEED	Selects the fieldbus reference FBA REF1 scaling and the actual value, which is sent to the fieldbus (FBA ACT1).
FPBA-01 ADAPTER MODULE CONFIGURATION 		
51.01 FBA TYPE	Profibus DP	Displays the type of the fieldbus adapter module.
51.02 NODE NUMBER	2	Each device on the Profibus network must have a unique node number. This parameter is used to define a node number for the drive it is connected to.
51.03 BAUD RATE	12000	This parameter indicates the detected communication speed in kbit/s; 12000 = 12 Mbit/s
51.04 TELEGRAM TYPE	5	This parameter indicates the selected telegram type for the Profibus communication. 5 = PPO Type 5.
51.05 PROFILE	2	This parameter is used to select which communication profile is used. 2 = Transparent 16.
51.06 T16 SCALE	1500	Reference multiplier/actual value divisor for the FPBA-01. The parameter is only effective when Transparent 16 profile is selected and the drive is using FBA communication profile. Reference value 0 to 65536 corresponds to scale 0 to 1500.
51.27 FBA PAR REFRESH	1	Validates any changed adapter module configuration parameter settings.
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 1 or A for parameters 51.01...51.26.		

Parameter	Application-specific setting	Function/Information
TRANSMITTED DATA SELECTION FROM DRIVE TO PLC 		
52.01 FBA DATA IN1 ... 52.12 FBA DATA IN12		Defines the data transmitted from drive to fieldbus controller and further to the PLC. Parameters are set according to the virtual address area of the drive. Note: If the length of the selected data is 32 bits, two parameters are reserved for the transmission.
52.01 FBA DATA IN1	4	Status word (16-bit). Mapping: PZD1
52.02 FBA DATA IN 2	5	Actual value 1 (16-bit). Mapping: PZD2
TRANSMITTED DATA SELECTION FROM PLC TO DRIVE 		
53.01 FBA DATA OUT 1 ... 53.12 FBA DATA OUT 12		Defines the data transmitted from fieldbus controller to drive. Note: If the length of the selected data is 32 bits, two parameters are reserved for the transmission.
53.01 FBA DATA OUT 1	1	Control word (16-bit). Mapping: PZD1
53.02 FBA DATA OUT 2	2	Reference 1 (16-bit). Mapping: PZD2
Note: In the User's Manual of the fieldbus adapter module, the parameter group number is 3 or C for parameters 52.01...52.12 and 2 or B for parameters 53.01...53.12.		
51.27 FBA PAR REFRESH	(1) REFRESH	Validates any changed adapter module configuration parameter settings.

Drive control parameters for the Transparent16 profile in DriveStudio

10 Start/stop/dir				
1	Ext1 start func	FBA	0	6
2	Ext1 start in1	DI1		
3	Ext1 start in2	C.False		
4	Ext2 start func	FBA	0	6
12 Operating mode				
1	Ext1/Ext2 sel	C.False		
3	Ext1 ctrl mode	Speed	1	5
5	Ext2 ctrl mode	Torque	1	5
7	Local ctrl mode	Speed	1	2
19 Speed calculation				
1	Speed scaling	1500 rpm	0	30000
21 Speed ref				
1	Speed ref1 sel	FBA ref1		
2	Speed ref2 sel	Zero		
3	Speed ref1 func	Ref1	0	5
4	Speed ref1/2 sel	C.False		
5	Speed share	1.000	-8.000	8.000
24 Torque ref				
1	Torq ref1 sel	FBA ref2		
2	Torq ref add sel	Zero		
3	Maximum torq ref	300.0 %	0.0	1000.0
4	Minimum torq ref	-300.0 %	-1000.0	0.0
5	Load share	1.000	-8.000	8.000
50 Fieldbus				
1	Fba enable	Enable	0	1
2	Comm loss func	Fault	0	3
3	Comm loss t out	0.3 s	0.3	6553.5
4	Fba ref1 modesel	Speed	0	2
5	Fba ref2 modesel	Torque	0	2
51 FBA settings				
1	FBA type	Profibus-DP	0	65535
2	FBA par2	2	0	65535
3	FBA par3	12000	0	65535
4	FBA par4	5	0	65535
5	FBA par5	2	0	65535
6	FBA par6	1500	0	65535
52 FBA data in				
1	FBA data in1	4	0	9999
2	FBA data in2	5	0	9999
53 FBA data out				
1	FBA data out1	1	0	9999
2	FBA data out2	2	0	9999

51 FBA settings

1 FBA type	Profibus-DP	0	65535
2 FBA par2	2	0	65535
3 FBA par3	12000	0	65535
4 FBA par4	5	0	65535
5 FBA par5	2	0	65535
6 FBA par6	1500	0	65535
7 FBA par7	0	0	65535
8 FBA par8	0	0	65535
9 FBA par9	0	0	65535
10 FBA par10	0	0	65535
11 FBA par11	0	0	65535
12 FBA par12	0	0	65535
13 FBA par13	0	0	65535
14 FBA par14	0	0	65535
15 FBA par15	0	0	65535
16 FBA par16	0	0	65535
17 FBA par17	0	0	65535
18 FBA par18	0	0	65535
19 FBA par19	0	0	65535
20 FBA par20	0	0	65535
21 FBA par21	0	0	65535
22 FBA par22	0	0	65535
23 FBA par23	0	0	65535
24 FBA par24	0	0	65535
25 FBA par25	0	0	65535
26 FBA par26	0	0	65535
27 FBA par refresh	DONE	0	1
28 Par table ver	DONE	0x0000	0xFFFF
29 Drive type code	REFRESH	0	65535

16 System

1 Local lock	C.False		
2 Parameter lock	Open	0	2
3 Pass code	0	0	21474836...
4 Param restore	Done	0	2
7 Param save	Done	0	1
9 User set sel	Done	1	10
10 User set log	Save	0	42949672...

The Control Word is used for sending commands from a master (PLC) to a slave unit (Drive). The start sequence for this example is given in the table below.

Step	Instruction	Control Word (Hex)	Operation	Status Word
1	Power up	0x0000	At setpoint. Zero speed.	0x2100
2	Reset fault (bit 8) Remote command (bit 11)	0x0900	Drive ready.	0x2101
3	Start (bit 1) Remote command (bit 11)	0x0802	Drive ready.	0x2101
4	Start (bit 1) Run enable (bit 7) Remote command (bit 11)	0x0882	Enabled. Running. Drive starts to modulate	0x210f
5	Set speed reference value to 6553. Corresponds to speed $6553/65536 \cdot 1500 = 150$ (rpm)	0x0882	Motor runs at reference speed	0x010f

Starting up fieldbus communication and programming the ABB PLC

What this chapter contains

This chapter presents the steps to take during the start-up of the drive fieldbus control with ABB AC500 PLC and PROFIBUS DP adapter module. The chapter introduces the communication setup, the PLC program, visualizations and how to run and test the program. For mechanical and electrical installation, PROFIBUS specific parameters, components, protocols and other details, see *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English]).

For more information on the PLC, see ABB AC500 PLC hardware manual and User Manual for PLC Programming with Codesys 2.3.

Safety



WARNING! Follow the safety instructions given in this manual and in the drive hardware manual.

Equipment and programs

Equipment used in the examples:

- **ACS850 demosuitcase** (order code 3AUA0000050654) containing one ACS850-04--03A0-5 drive with FPBA-01 PROFIBUS DP Adapter Modules



- **AC500 demosuitcase TA510-CASE:** AC500 PLC *) equipped with a CPU of type PM571 and a communications module, CM572-DP, for communication over PROFIBUS DP fieldbus.



Programs used in the examples:

- ACS850 Standard Control Program version UMFI 2020
- ABB DriveStudio PC tool
- AC500 Control Builder PS501 *). Code of the installation CD: 1SAP 190 100 R0002 C3 V1.3.1 / 04.2009

*) Manufacturer ABB STOTZ-KONTAKT GmbH, <http://www.abb.de/stotz-kontakt>

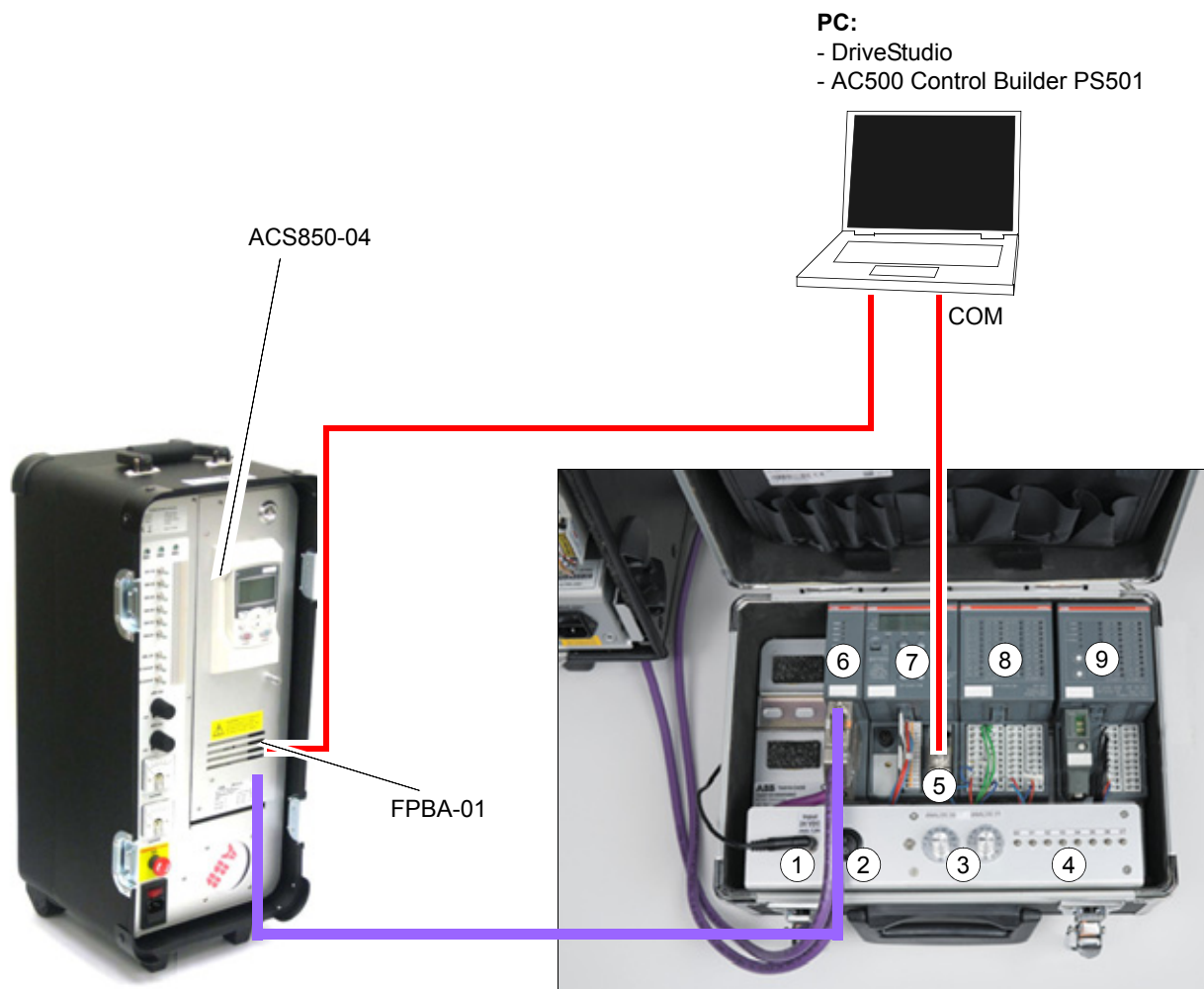
Start-up flowchart

The steps of the start-up procedure are presented below. Perform the steps from first to last.

No.	Task	Description / See instruction
ELECTRICAL INSTALLATION		In this section, you wire the equipment used in this programming example.
1	Connect the PC RJ-45 cable to drive terminal X7.	<i>ACS850-04 Drive Modules (1.1 to 45 kW) Hardware Manual</i> (3AUA0000045496 [English]) Page 61
2	Connect the PLC fieldbus master (CM572-DP) to the fieldbus adapter module (FPBA-01) of the drive.	Installation of the TA510-CASE , page 61
3	Connect the PC serial port (COM) to the PLC programming port. OR: Connect the PC Ethernet port to the PLC Ethernet port with an RJ-45 Ethernet cable. OR: Connect the PLC serial port to the PC USB port with a TK503 programming cable	Installation of the TA510-CASE , page 61 TK503 programming cable order code: 1TN968901R1100
		
SOFTWARE INSTALLATION		In this section, you install the programming tools.
1	Install the DriveStudio PC tool if not yet installed.	Installing the DriveStudio PC tool , page 62
2	Install the AC500 Control Builder PS501 software.	Installing the AC500 Control Builder PS501 software , page 62
3	Install additional GSD files.	Installing additional GSD files , page 63
		
PROGRAMMING		In this section, you set up the communication between the drive and the PLC and make the PLC program that controls the drive through fieldbus.
— — — ONE-DRIVE SYSTEM — — —		
1	Set the drive control program parameters.	In this section you set the drive parameters needed for communication with the FPBA-01 fieldbus adapter module. Setting the drive control program parameters , page 65

No.	Task	Description / See instruction
2	Set up the communication.	In this section, communication between the PLC and the drive is configured. Setting up the communication, page 69 • Create a new project, page 69 • Configure communication with the SYCON.net fieldbus configurator, page 75
3	PLC main program introduction.	In this section, PLC main program is introduced. Introduction to the PLC main program, page 89 • Main program, page 89 • Local variables, page 91 • Global variables, page 91 • How to add function blocks, page 92
4	Introduction to the actions.	In this section, actions are introduced. Introduction to the actions, page 97 • speed_scaling, page 98 • How to create actions, page 99
5	Introduction to the visualization.	In this section, visualizations are introduced. Introduction to the visualizations, page 101 • How to create an empty visualization field, page 102 • How to create and configure buttons, page 102 • How to create indicators, page 105
6	Run and test the program.	In this section, you run and test the program that you have made. Running and testing the program, page 107 • How to download the program to the controller and run the program, page 107 • ABB Drives profile; Run at reference speed, page 110 • ABB Drives profile; Stopping, page 116 • ABB Drives profile: Run at reference torque, page 120 • ABB Drives profile; Parameter handling (PKW 1-4 Read/Write) Reading a parameter, page 124 • ABB Drives profile; Parameter handling (PKW 1-4 Read/Write) Writing a parameter, page 126 • Parameter handling; mapping parameters to the cyclic process data (PZD) communication channel, page 127 • How to perform online monitoring, page 129

Connections



ACS850-04 Democase with FPBA-01 module installed to the slot 3. Module is connected to the CM572-DP Profibus master.

Installation of the TA510-CASE

- ① 24 V DC input socket
- ② 24 V DC on/off switch
- ③ Analog potentiometer
- ④ Digital switches
- ⑤ Programming port
- ⑥ CM572-DP communication module
- ⑦ CPU unit PM571
- ⑧ Analog module AX522
- ⑨ Remote digital I/O module DC505-FBP

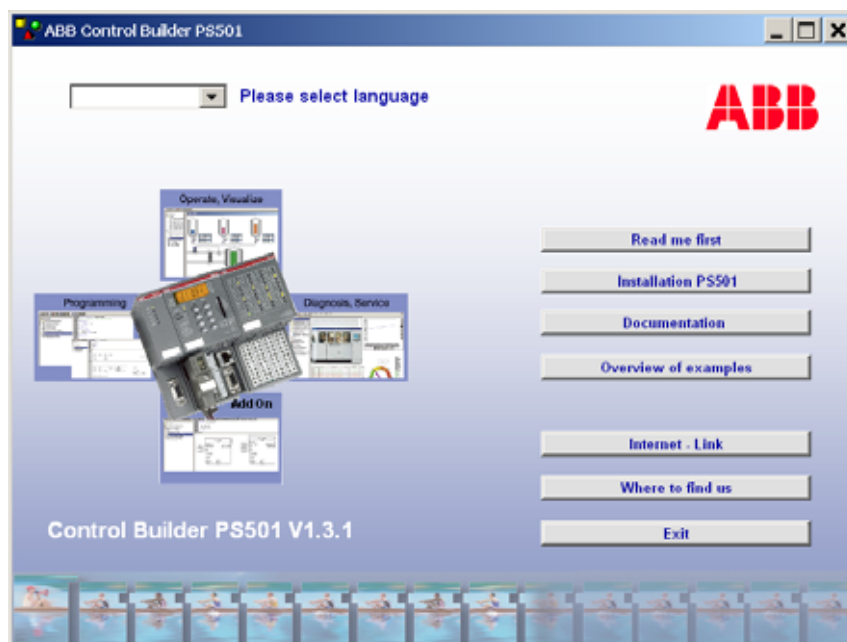
Installing the DriveStudio PC tool

Insert the DriveStudio installation CD into the CD drive of your the PC. Follow the instructions given by the installation program.

For more information, see DriveStudio online Help folder DriveStudio: Installing and uninstalling.

Installing the AC500 Control Builder PS501 software

1. Insert the AC500 Control Builder PS501 installation CD into the CD drive of your PC. Click the **Read me first** button and read the instructions.
2. Click the **Installation PS501** button.

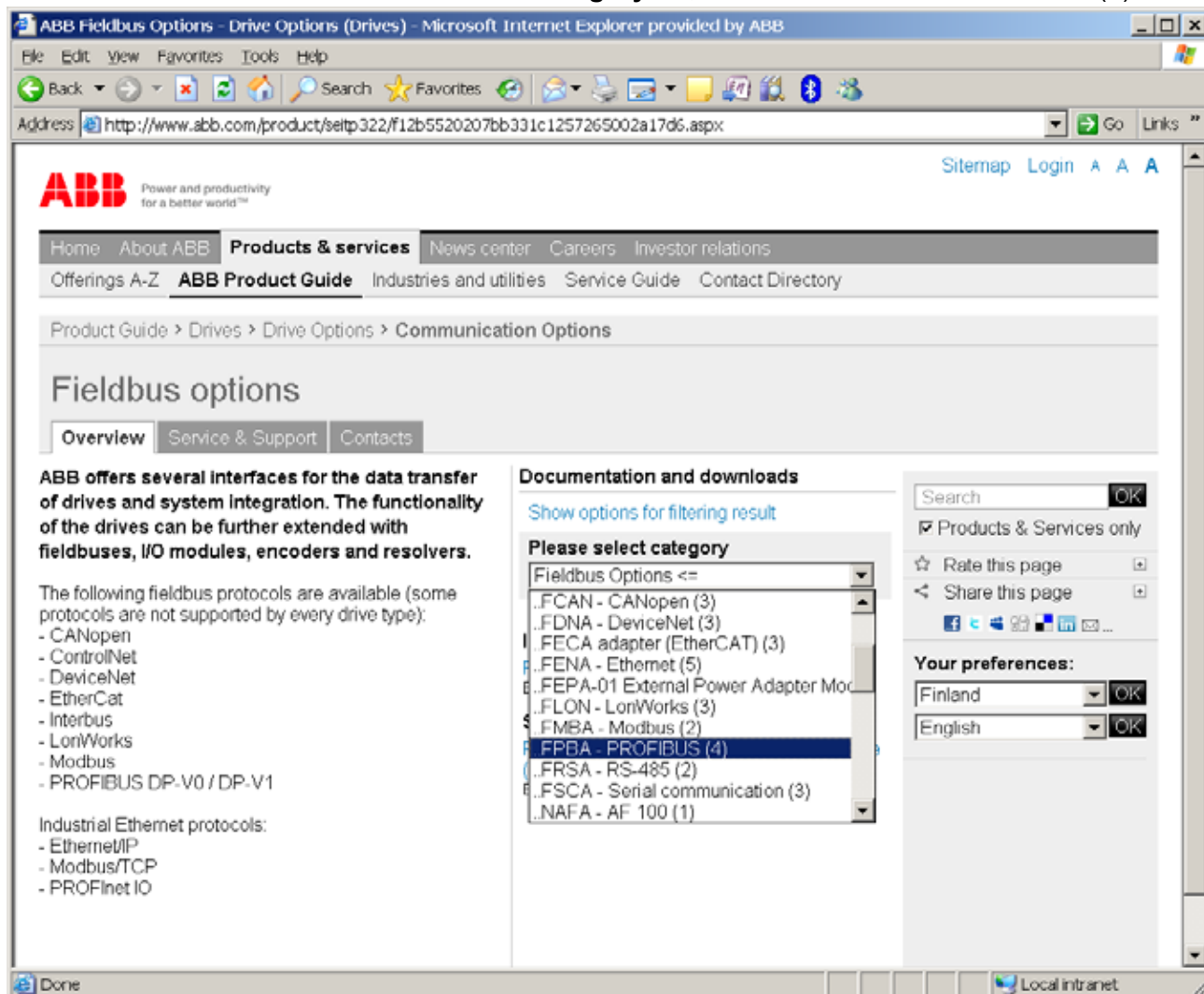


3. Click the **Read me for installation** button and read the instructions.
4. Click the **Step 1: Installation Control Builder PS501** button. Follow the instructions.
5. Click the **Step 2: Installation Fieldbus Configuration SYCON.net** button. Follow the instructions.
6. Click the **Installation GSD and ESD files** button. Follow the instructions.
7. Click the **Opt. 1: Installation CoDeSys Service Tool**.

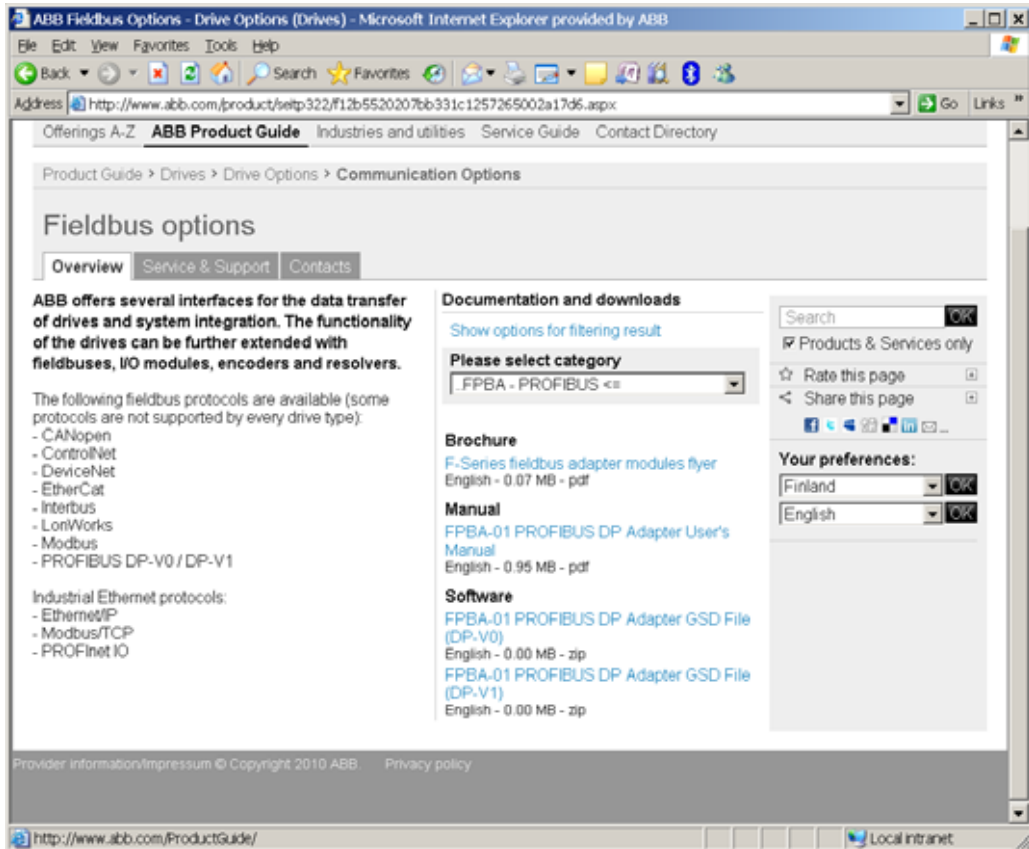
Installing additional GSD files

You can find the GSD files for the FPBA-01 module on the manufacturer's website.

1. Go to www.abb.com and select Product Guide / Drives / Drive Options / Fieldbus options.
2. From the **Please select category** list, select "...FPBA-01 - PROFIBUS (4)".

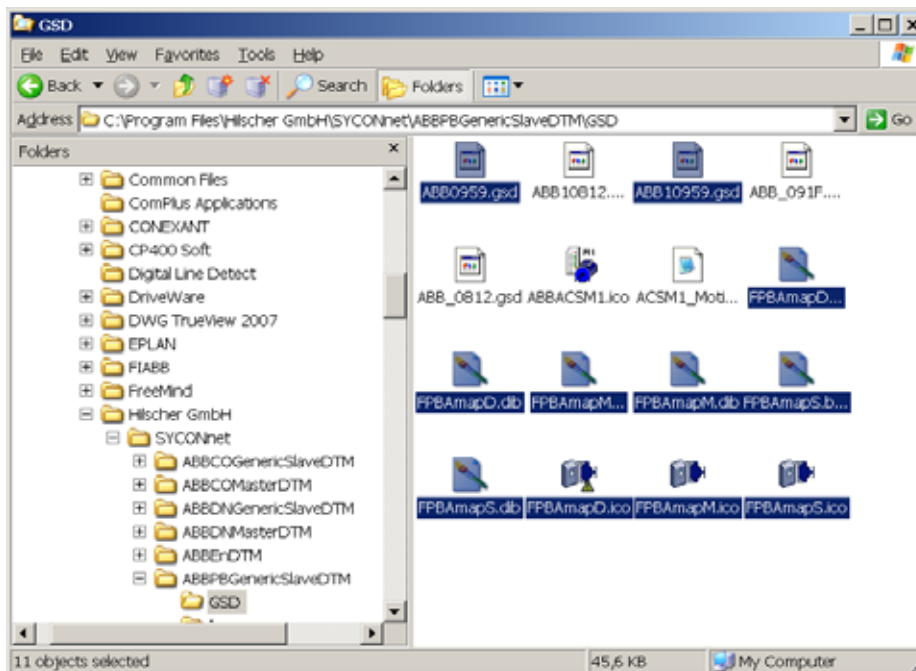


3. Under **Software**, download FPBA-01 Profibus DP Adapter GSD Files.



Note: Under **Manual**, you can also download *FPBA-01 Profibus DP Adapter Module User's Manual*

4. Unzip the GSD files and copy them into following folder on your PC:
C:\Program Files\Hilscher GmbH\SYCONnet\ABBPBGenericSlaveDTM\GSD



Step**Setting the drive control program parameters**

This section lists the ACS850 Standard Control Program parameter settings that you need to set for successful communication with the FPBA-01 fieldbus adapter module. This setup is for the ABB Drives profile. Set all other necessary parameters to meet the application needs.

For more information on the parameters, refer to previous chapters of this manual and to *ACS850 Standard Control Program Firmware Manual* (3AUA0000045497 [English])

For advice on using the DriveStudio, refer to the DriveStudio online Help.

Step

Setting the drive control program parameters

1. Open the DriveStudio. Set the parameters listed below. This setup is for the ABB Drives profile.

10 Start/stop/dir				
1 Ext1 start func	FBA	0	6	
2 Ext1 start in1	DI1			
3 Ext1 start in2	C.False			
4 Ext2 start func	FBA	0	6	
12 Operating mode				
1 Ext1/Ext2 sel	C.False			
3 Ext1 ctrl mode	Speed	1	5	
5 Ext2 ctrl mode	Torque	1	5	
7 Local ctrl mode	Speed	1	2	
19 Speed calculation				
1 Speed scaling	1500 rpm	0	30000	
21 Speed ref				
1 Speed ref1 sel	FBA ref1			
2 Speed ref2 sel	Zero			
3 Speed ref1 func	Ref1	0	5	
4 Speed ref1/2 sel	C.False			
5 Speed share	1.000	-8.000	8.000	
24 Torque ref				
1 Torq ref1 sel	FBA ref2			
2 Torq ref add sel	Zero			
3 Maximum torq ref	300.0 %	0.0	1000.0	
4 Minimum torq ref	-300.0 %	-1000.0	0.0	
5 Load share	1.000	-8.000	8.000	
50 Fieldbus				
1 Fba enable	Enable	0	1	
2 Comm loss func	Fault	0	3	
3 Comm loss t out	0.3 s	0.3	6553.5	
4 Fba ref1 modesel	Speed	0	2	
5 Fba ref2 modesel	Torque	0	2	
51 FBA settings				
1 FBA type	Profibus-DP	0	65535	
2 FBA par2	2	0	65535	
3 FBA par3	12000	0	65535	
4 FBA par4	5	0	65535	
5 FBA par5	1	0	65535	
52 FBA data in				
1 FBA data in1	4	0	9999	
2 FBA data in2	5	0	9999	
3 FBA data in3	6	0	9999	

Step

Setting the drive control program parameters

53 FBA data out			
1 FBA data out1	1	0	9999
2 FBA data out2	2	0	9999
3 FBA data out3	3	0	9999
51 FBA settings			
1 FBA type	Profibus-DP	0	65535
2 FBA par2	2	0	65535
3 FBA par3	12000	0	65535
4 FBA par4	5	0	65535
5 FBA par5	1	0	65535
6 FBA par6	1500	0	65535
7 FBA par7	0	0	65535
8 FBA par8	0	0	65535
9 FBA par9	0	0	65535
10 FBA par10	0	0	65535
11 FBA par11	0	0	65535
12 FBA par12	0	0	65535
13 FBA par13	0	0	65535
14 FBA par14	0	0	65535
15 FBA par15	0	0	65535
16 FBA par16	0	0	65535
17 FBA par17	0	0	65535
18 FBA par18	0	0	65535
19 FBA par19	0	0	65535
20 FBA par20	0	0	65535
21 FBA par21	0	0	65535
22 FBA par22	0	0	65535
23 FBA par23	0	0	65535
24 FBA par24	0	0	65535
25 FBA par25	0	0	65535
26 FBA par26	0	0	65535
27 FBA par refresh	DONE	0	1
28 Par table ver	DONE	0x0000	0xFFFF
29 Drive type code	REFRESH	0	65535
16 System			
1 Local lock	C.False		
2 Parameter lock	Open	0	2
3 Pass code	0	0	21474836...
4 Param restore	Done	0	2
7 Param save	Done	0	1
9 User set sel	Done	1	10
10 User set log	Save	0	42949672...

Tool/Step**Setting up the communication**

This section contains detailed instructions on how to configure Profibus DP network using the CodeSys program and SYCON.net configuring tool.

The instructions illustrate how the network is configured with the ready-made project ABB_drives_PB_demo.pro. The CodeSys project ABB_drives_PB_demo.pro is stored in the ABB library, "vault ID" part 2.

You can use ABB_drives_PB_demo.pro without changes or modify the selections by using the instructions below. The example selections correspond to the ready-made project.

Create a new project

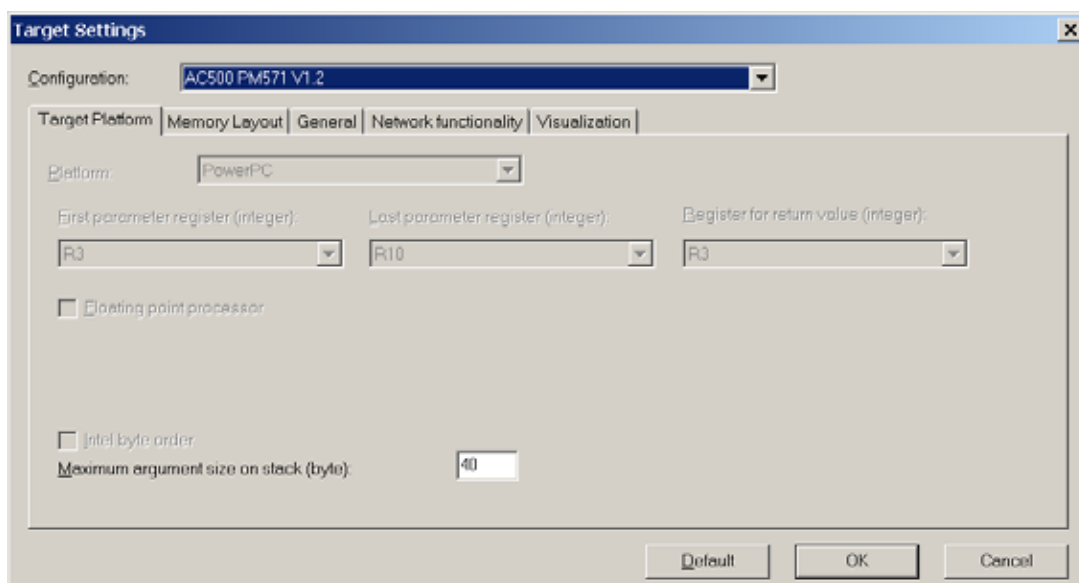
1. Open the AC500 Control Builder PS501 programming tool by double-clicking the icon:



Installation path:

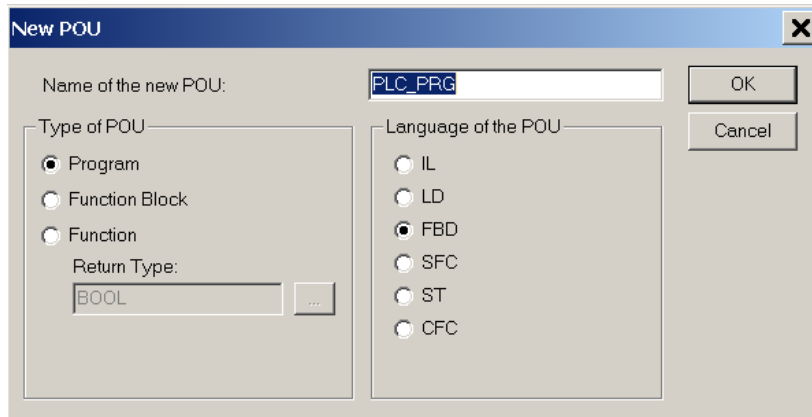
C:\Program Files\3S Software\CoDeSys V2.3\Codesys.exe

2. Select from the **File** menu **New**. Dialog box **Target settings** opens.
3. In the **Configuration:** box, select your CPU type (example: AC500 PM571 V1.2). Click **OK**.

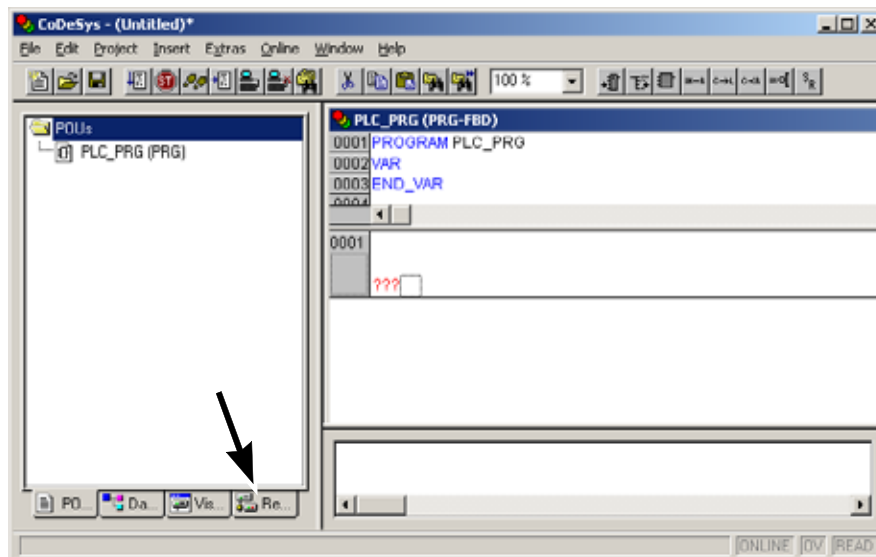


Tool/Step Setting up the communication

4. In the **New POU** dialog box, select as shown below.

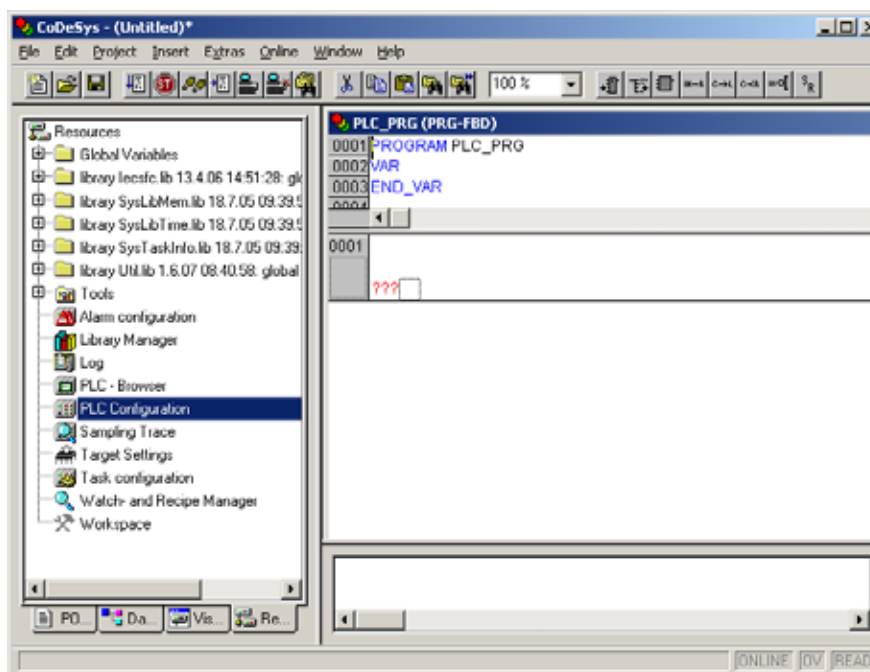


5. The programming view opens. Open the **Resources** field by clicking its tab.

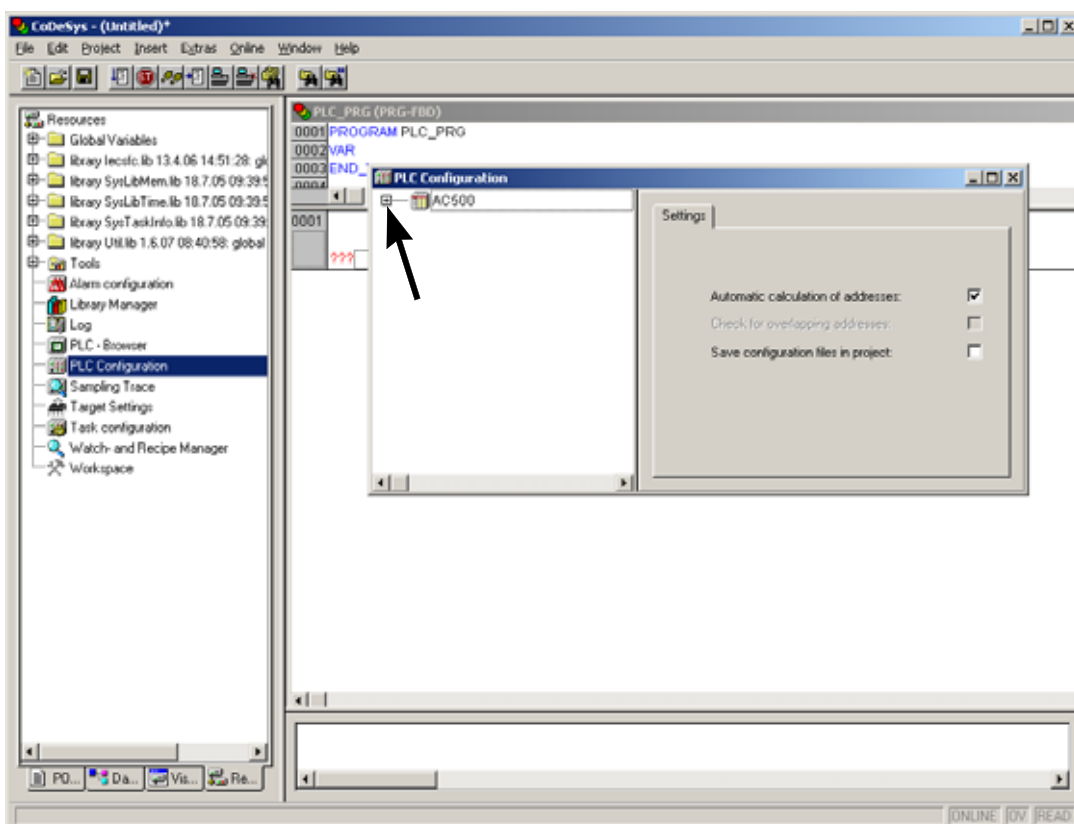


Tool/Step **Setting up the communication**

6. In the **Resources** folder, double-click PLC Configuration.

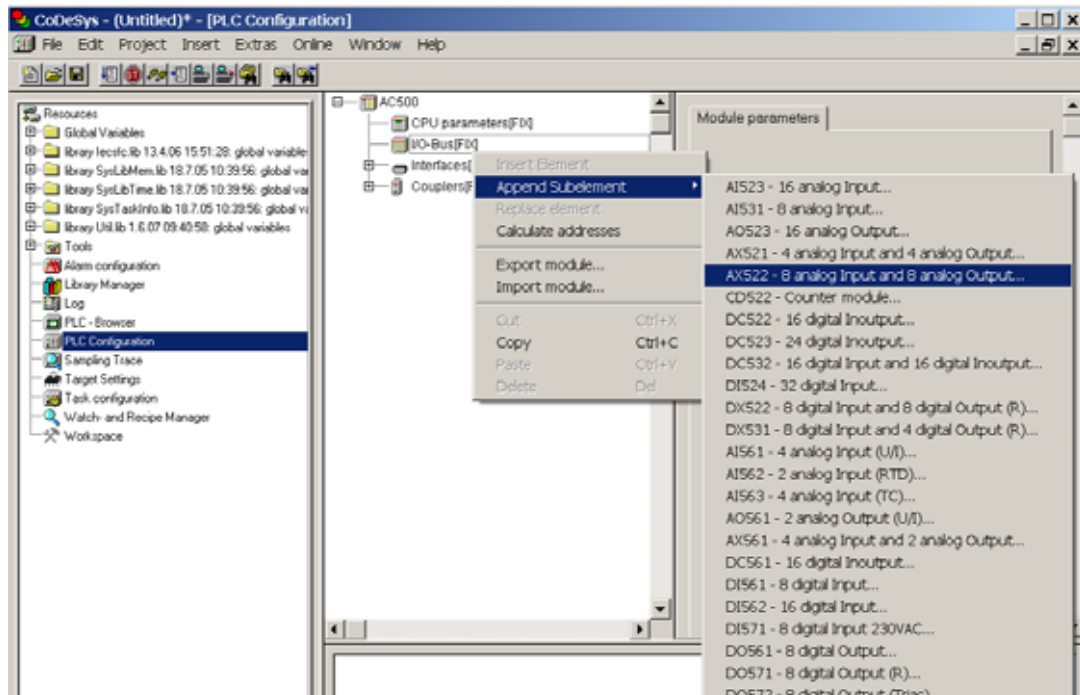


7. In the **PLC Configuration** dialog box, click the plus sign to open the AC500 folder.

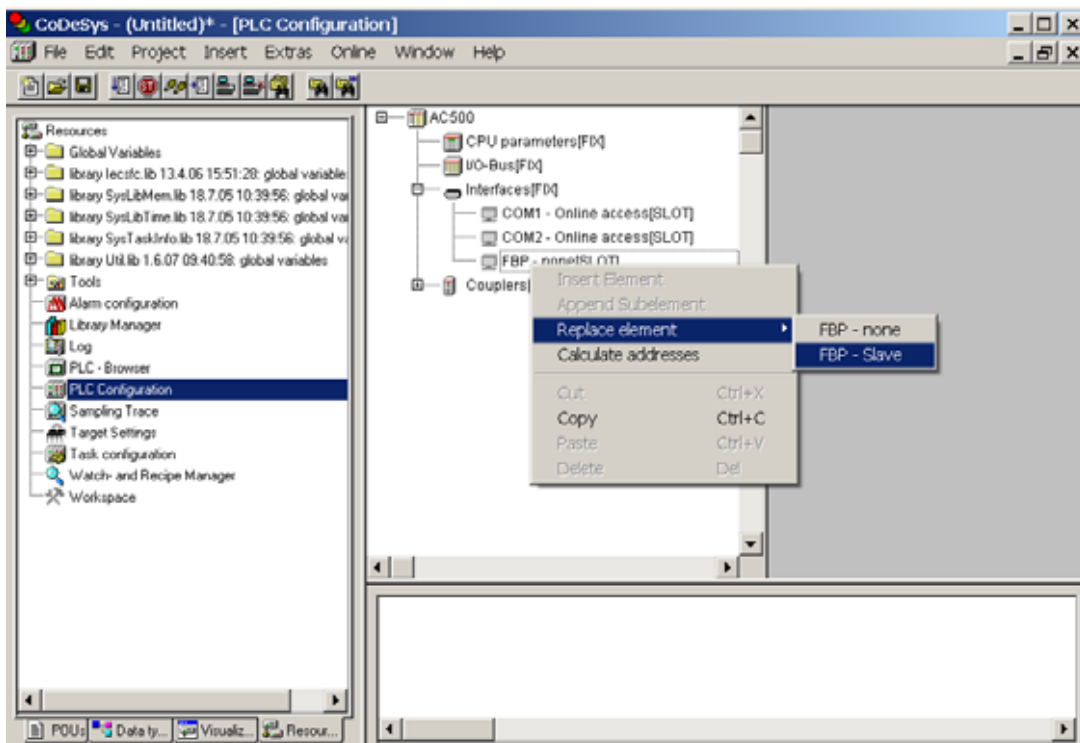


Tool/Step Setting up the communication

8. If you are using an I/O bus, add the relevant I/O bus to the system configuration. Right-click the I/O Bus[FX] folder. Select **Append Subelement** and select one of the I/O bus options (example: **AX522 - 8 analog Input and 8 analog Output...**).

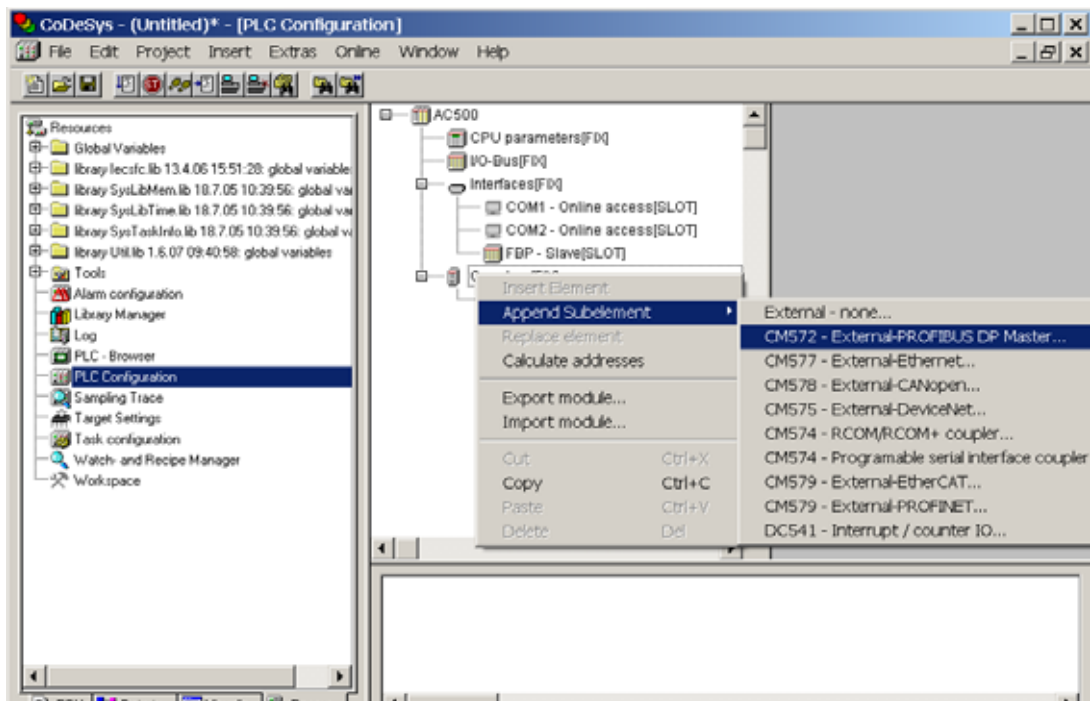


9. In the Interfaces [FX] folder, right-click the FBP-none[SLOT] file and select **Replace element** and **FBP - Slave**.

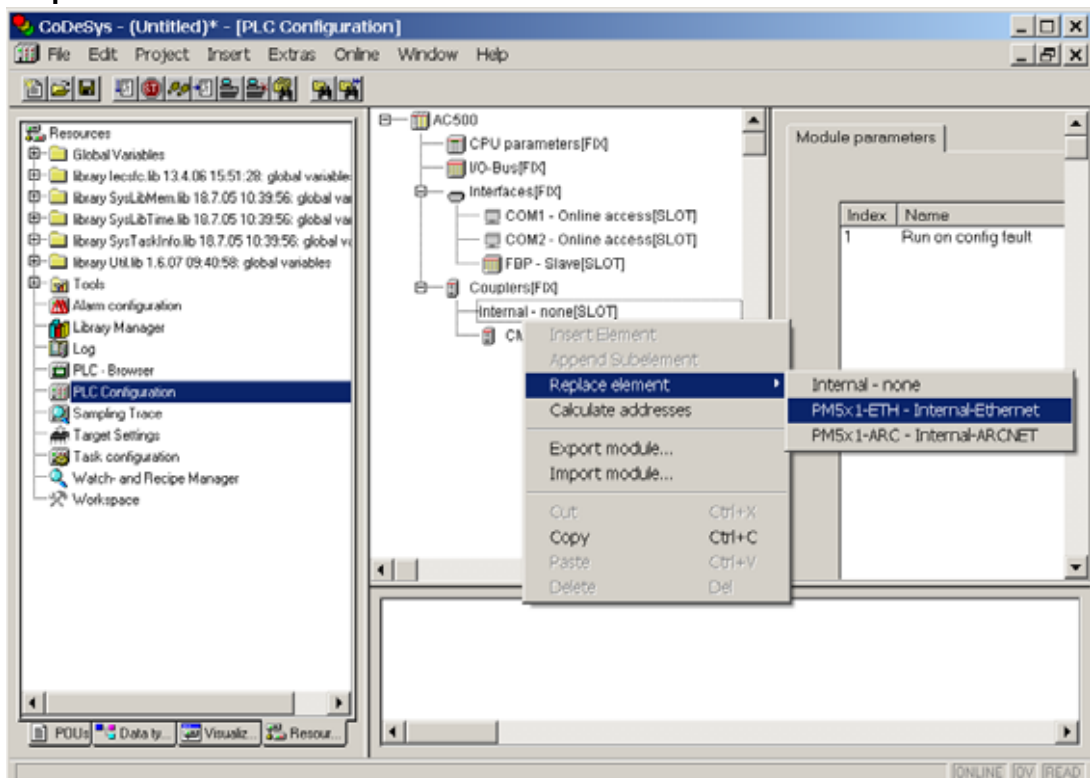


Tool/Step Setting up the communication

10. Right-click the Couplers[FIX] folder. Select **Append Subelement** and **CM572 - External-Profibus DP Master...**

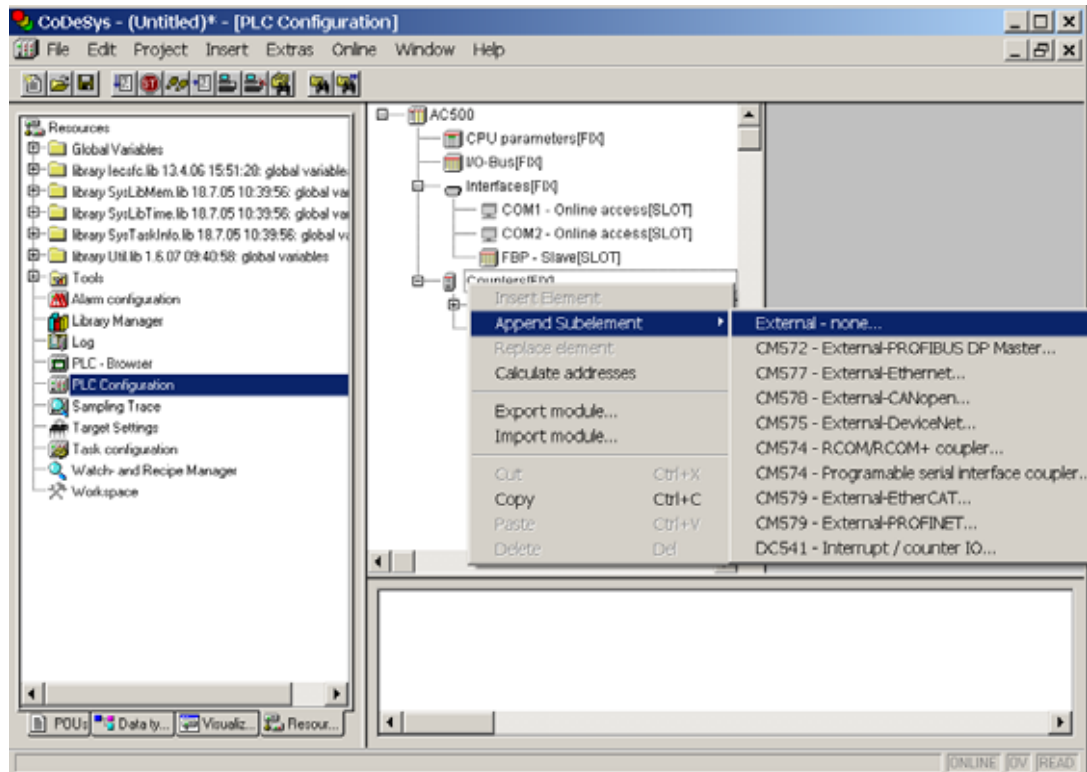


11. In the Couplers[FIX] folder, right-click the Internal - none[SLOT] file and select **Replace element** and **PM5x1-ETH - Internal-Ethernet**.

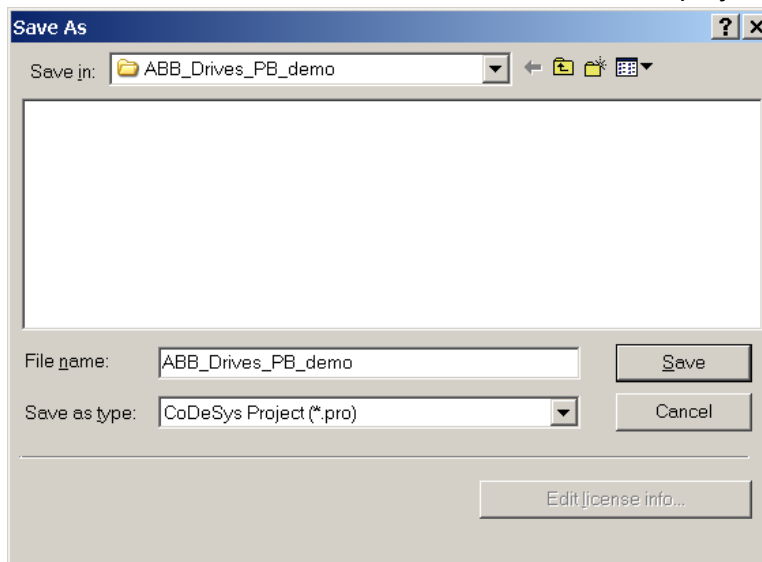


Tool/Step Setting up the communication

12. Right-click the Couplers[FIX] folder. Select **Append Subelement** and **External - none...**



13. From the **File** menu, select **Save as** and name the project. Click **Save**.



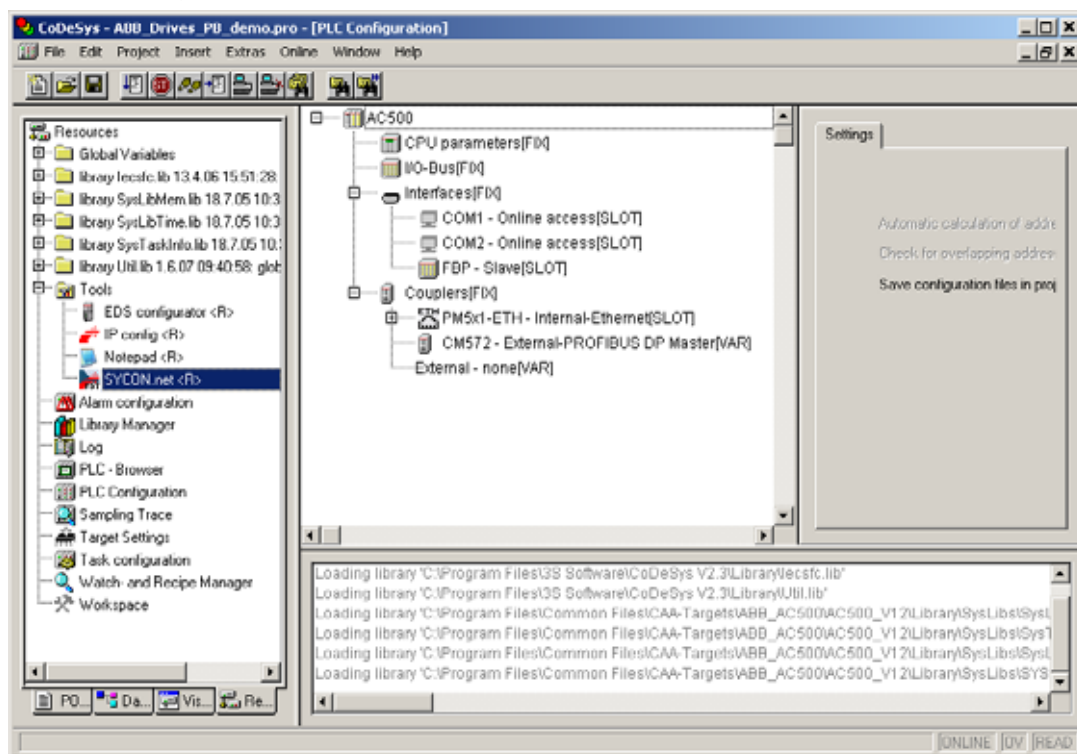
Tool/Step

Setting up the communication

CoDeSys

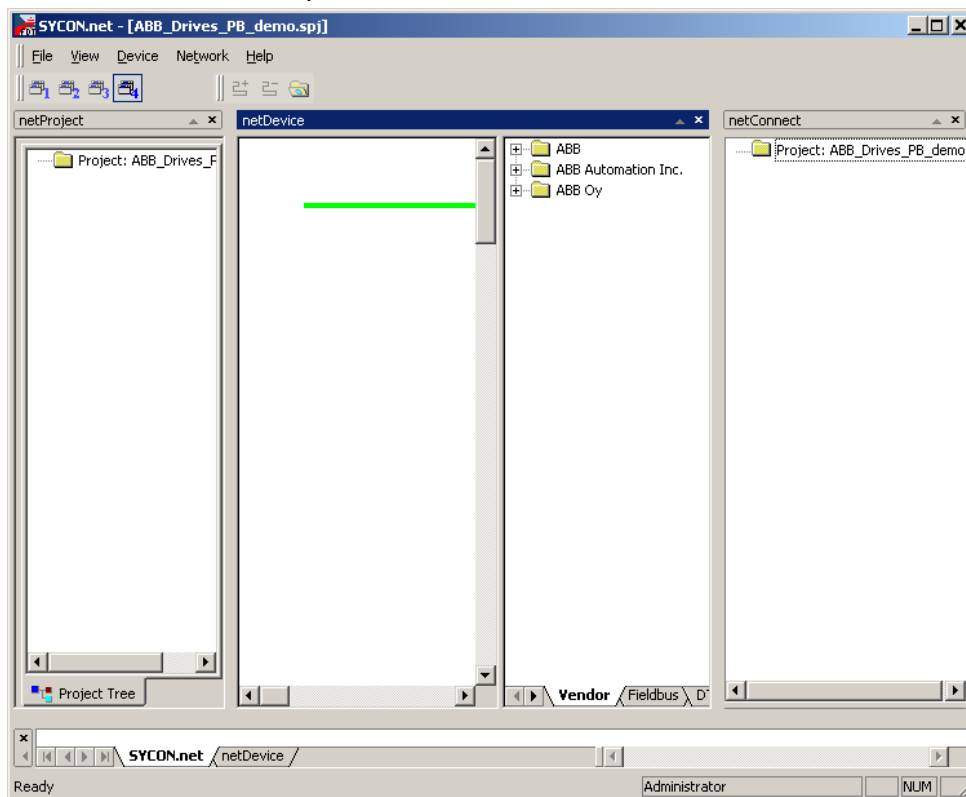
Configure communication with the SYCON.net fieldbus configurator

1. Click the **Resources** tab to show the Resources folders.
2. Under **Tools**, double-click SYCON.net <R>.

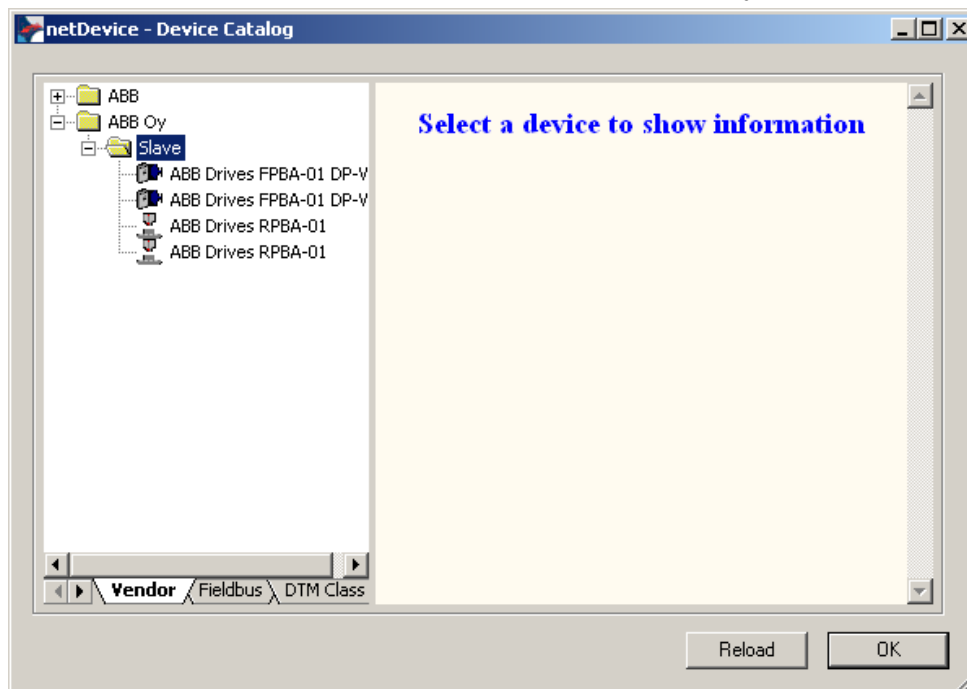


Tool/Step Setting up the communication

3. The SYCON.net tool opens:



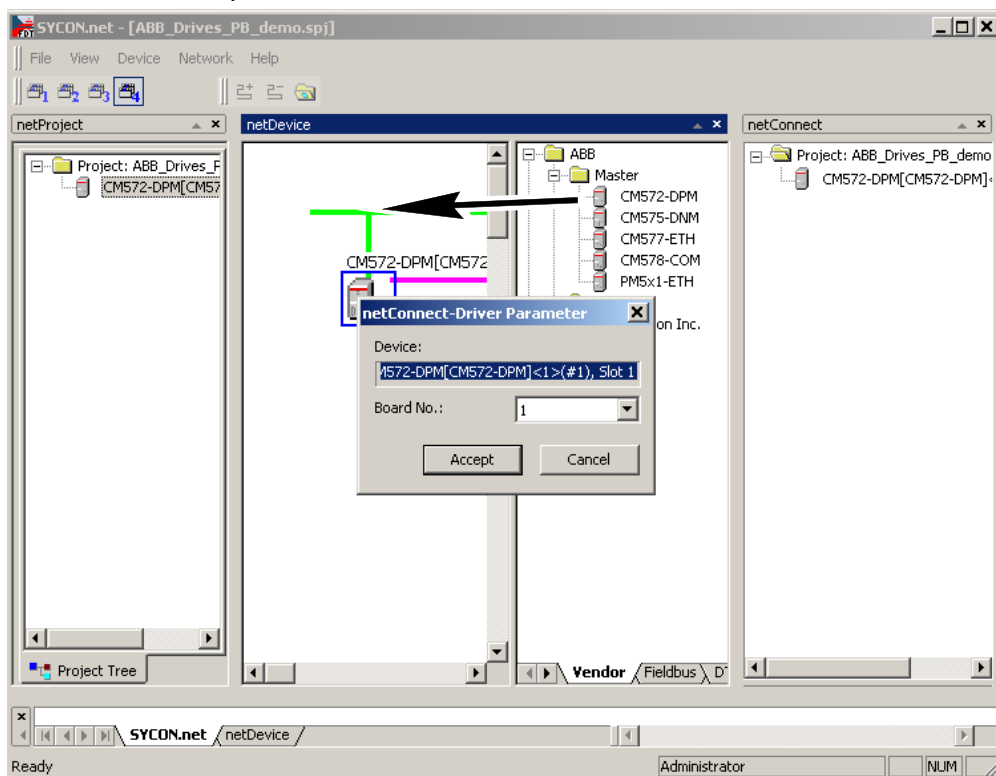
4. From the **Network** menu, select the **Device Catalog...** command. Click the **Reload** button. PROFIBUS options appear in the ABB Oy folder. Click **OK**.



Tool/Step

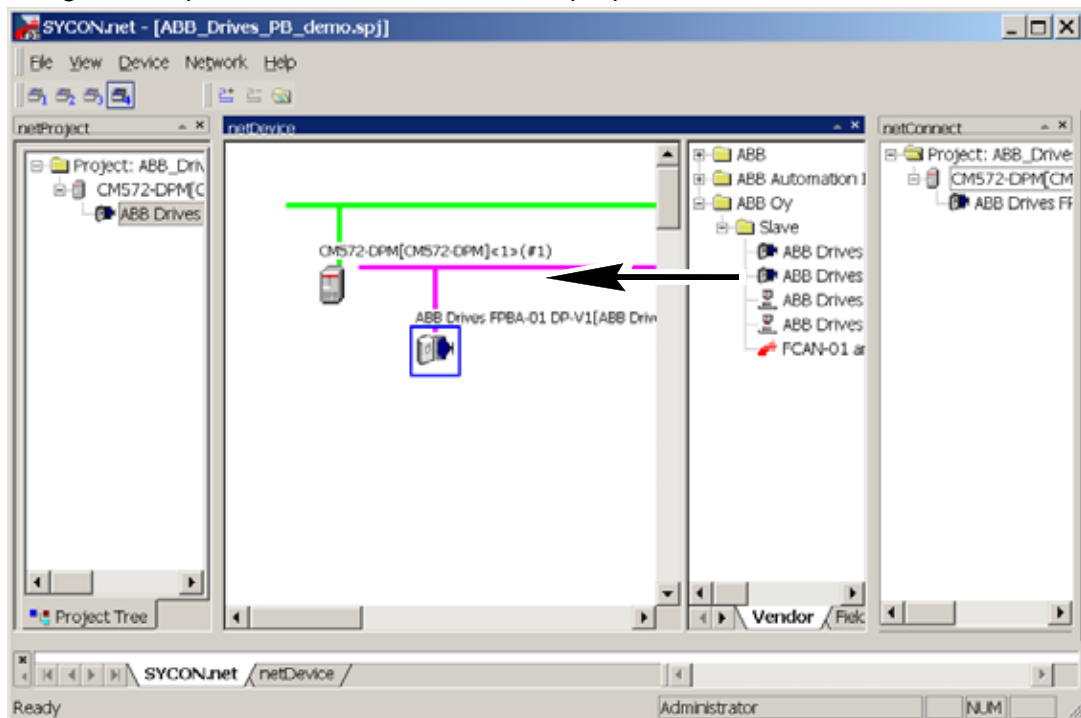
Setting up the communication

5. Drag and drop CM572-DPM on the green line. In the **netConnect-Driver Parameter** dialog box, select 1 for the **Board no:** box. This is because the CM572-DP communications module is installed next to the CPU on the left-hand side in the installation example of this manual.



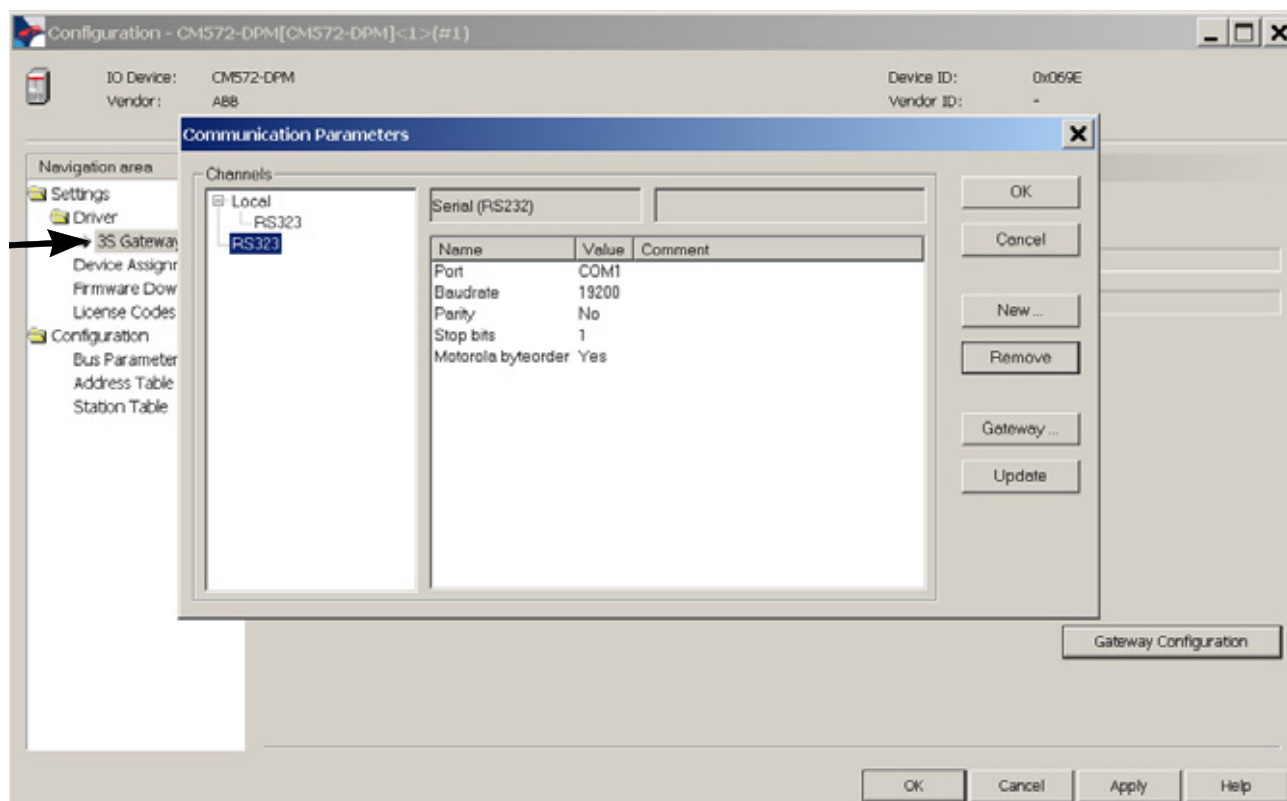
Tool/Step Setting up the communication

6. Drag and drop the FPBA-01 DP-V1 on the purple line.



Tool/Step Setting up the communication

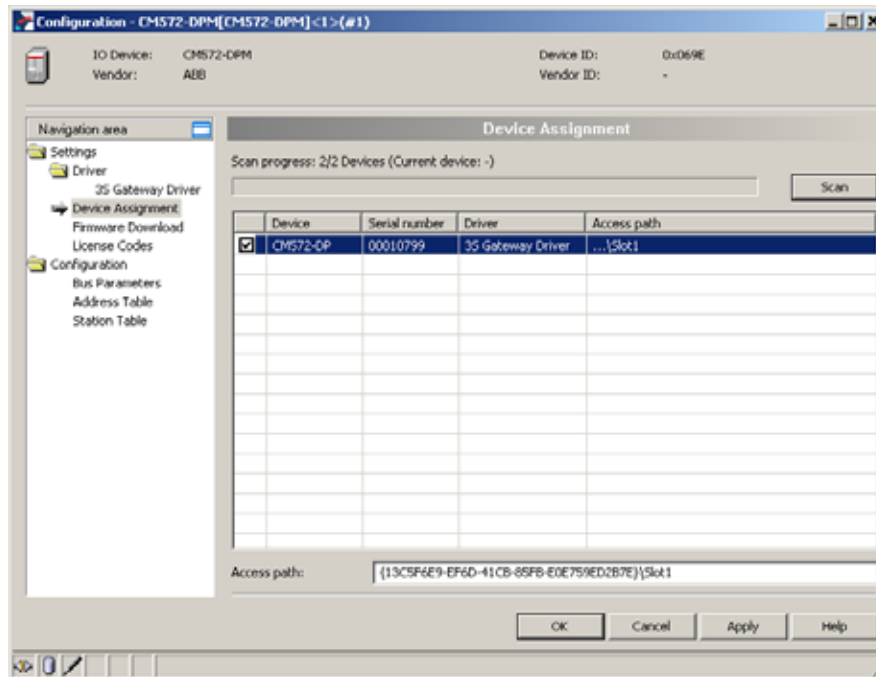
7. In the **netDevice** field, right-click the CM572-DPM icon. Select **Configuration**. In the **Navigation area** field, click 3S Gateway Driver. Click the **Gateway Configuration** button.



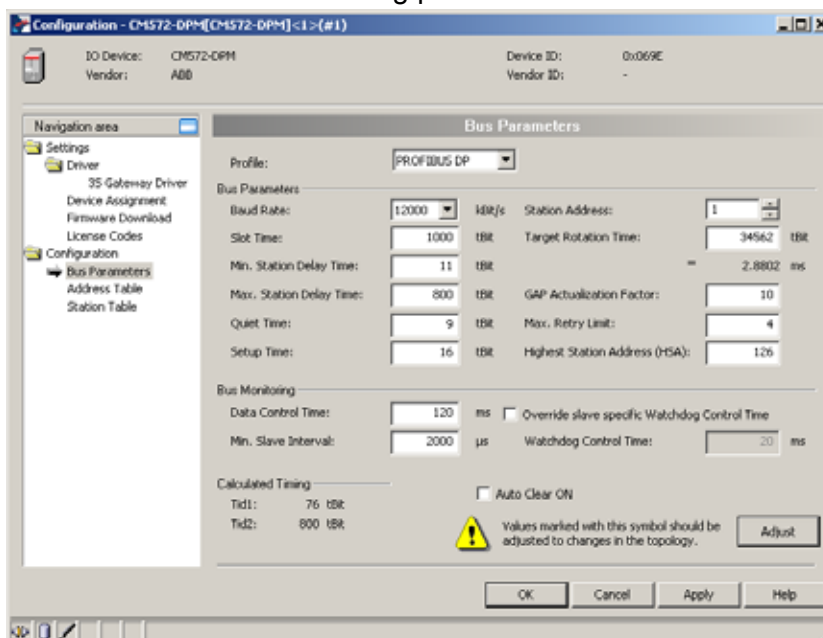
8. In the **Communication Parameters** dialog box, set the communication parameters according to the communication settings of your PC. See [Appendix A - How to find out the serial communication parameter values of your PC?](#).

Tool/Step Setting up the communication

9. In the **Navigation area**, click Device Assignment. Activate the device by ticking it.



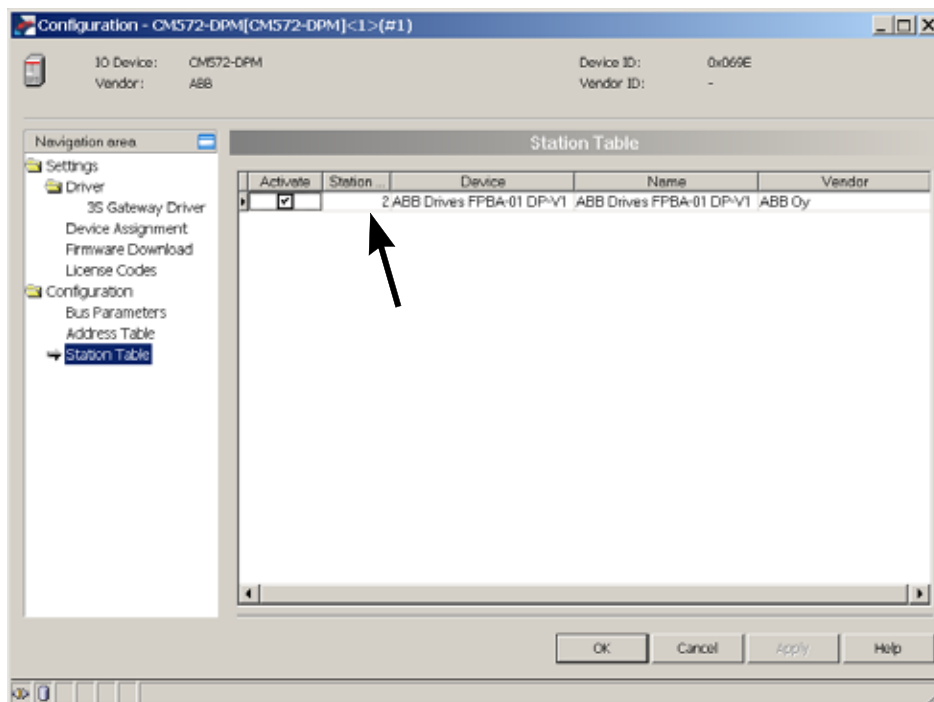
10. In the **Navigation area**, click Configuration / Bus Parameters. In the **Bus Parameters** dialog box, set the Baud Rate. If there is warning sign, click the **Adjust** button and set the other timing parameters.



Tool/Step **Setting up the communication**

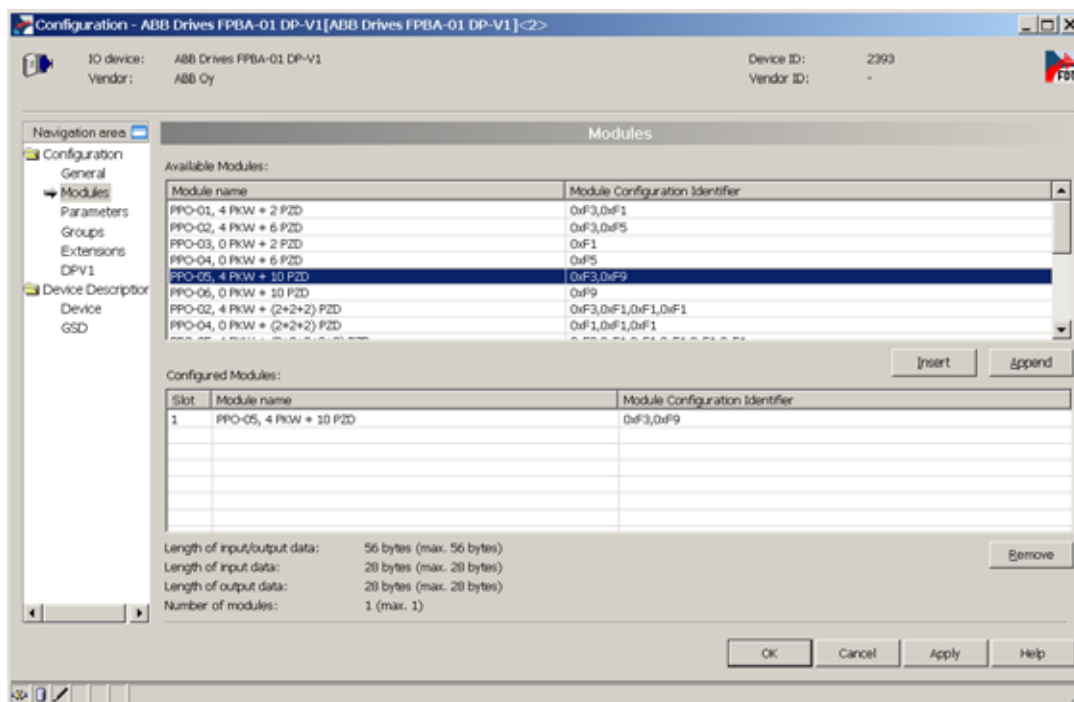
11. In the **Navigation area**, click Configuration / Station Table. Set the station address for the FPBA-01. Click the **Apply** button and then **OK**.

Note: The station address here must be the same as the value of Parameter 51.02 FBA PAR2 in the drive control program. Set parameter Parameter 51.02 FBA PAR2 with DriveStudio.



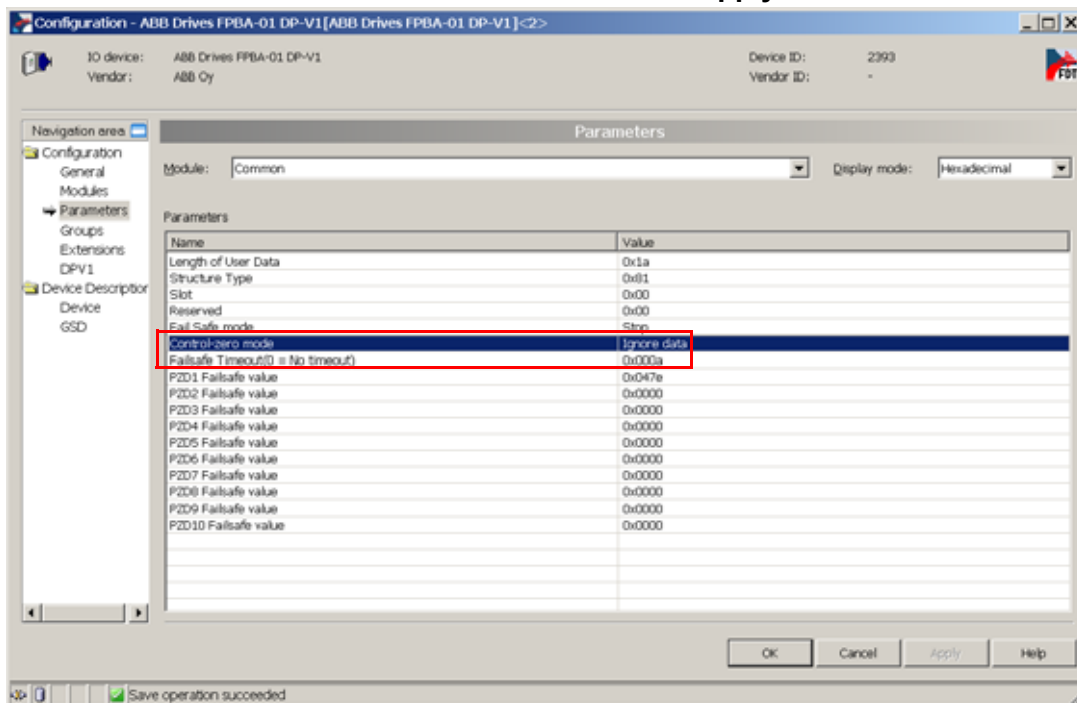
Tool/Step Setting up the communication

12. Right-click the ABB Drives FPBA-01 icon connected to the purple line in the netDevice field. In the Navigation area field, click Modules in the Configuration folder. In the Available modules: box, select PPO-05. Click the **Insert** button and then **Apply**.



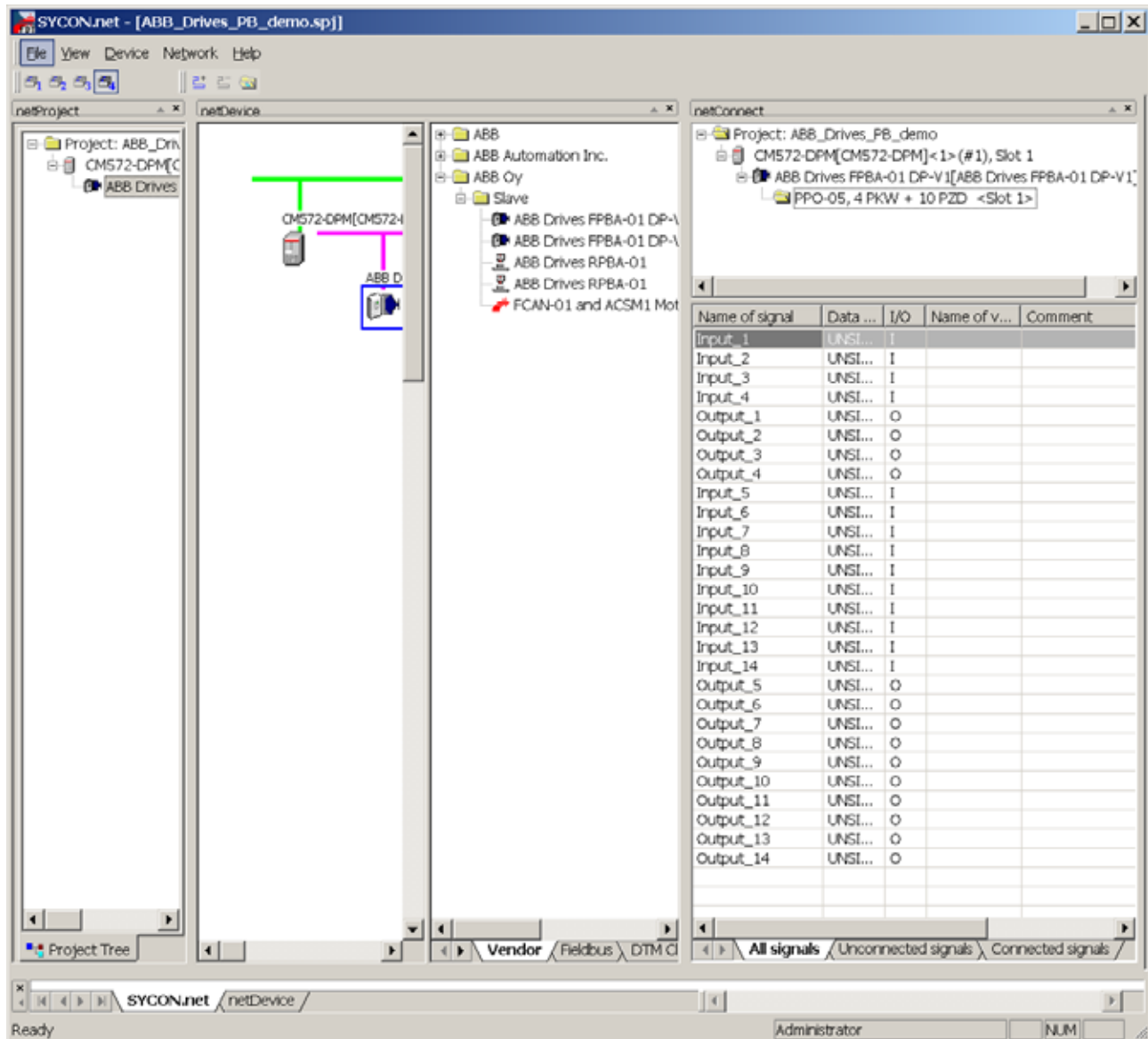
Tool/Step Setting up the communication

13. In the Configuration folder, click Parameters. Set the values of parameters Fail Safe mode and Control-zero mode as shown below. Click **Apply** and then **OK**.



Tool/Step Setting up the communication

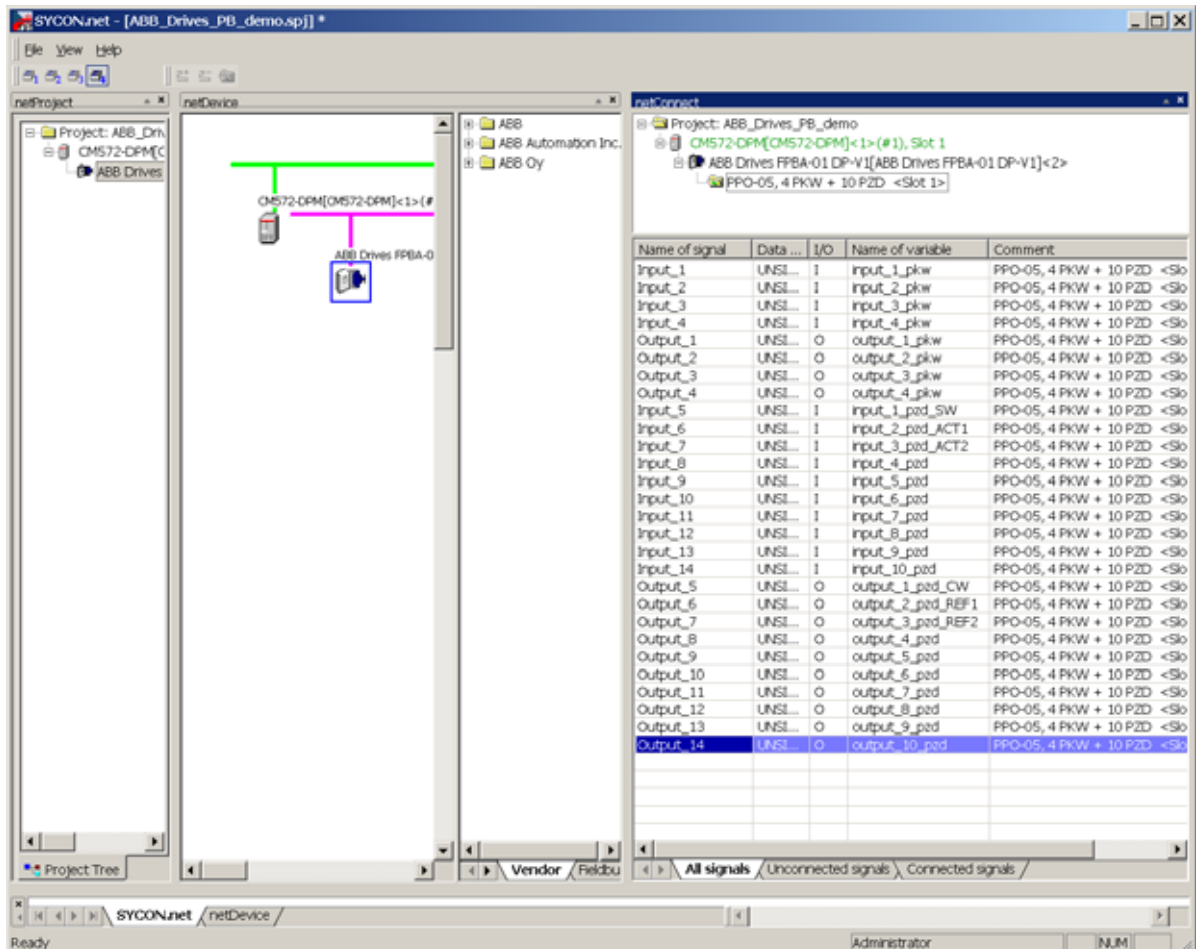
14. In the **netConnect** field, click PPO-5, 4PKW + 10 PZD <Slot 1>. A list of inputs and outputs appears.



Tool/Step **Setting up the communication**

15. Name the signals in the **netConnect** field. See the designation of the signals in the image below.

Note: You can name all signals here and they will be automatically declared in the Control Builder.

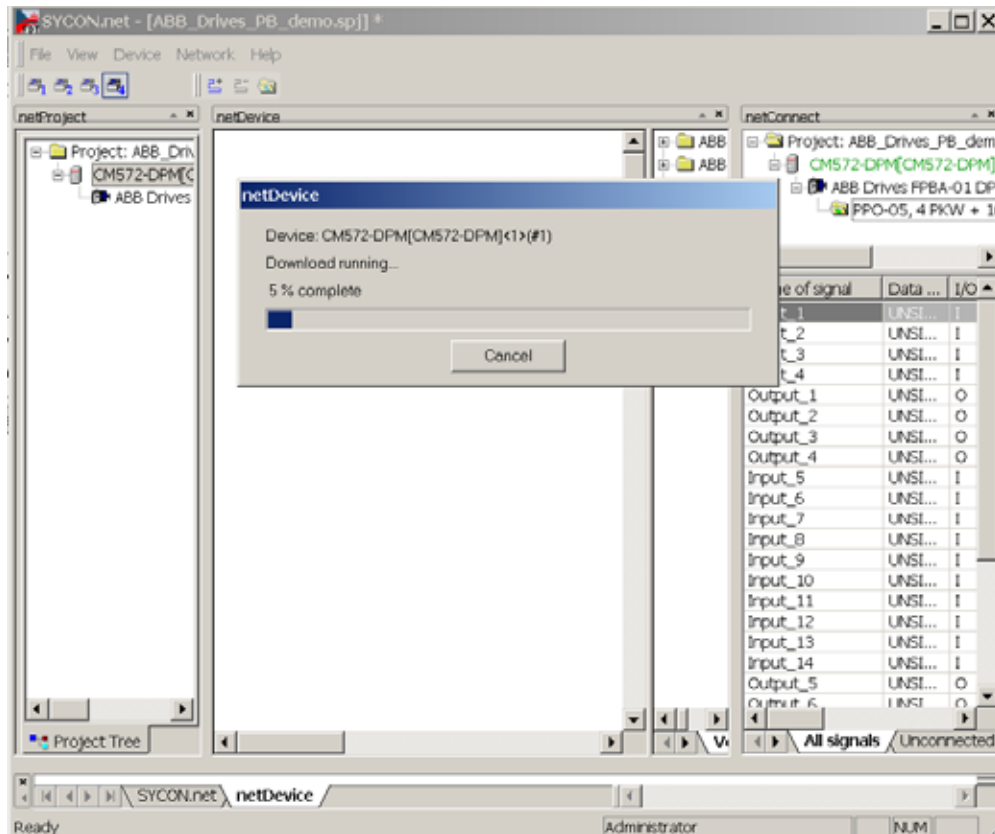


16. Check that the PLC is in the Stop state (Stop in the display).

Note: The downloading is not possible if the PLC is in the Run state.

Tool/Step Setting up the communication

17. Download the communication configuration to the PLC: first, right-click the CM572-DPM icon and, then click **Download**.



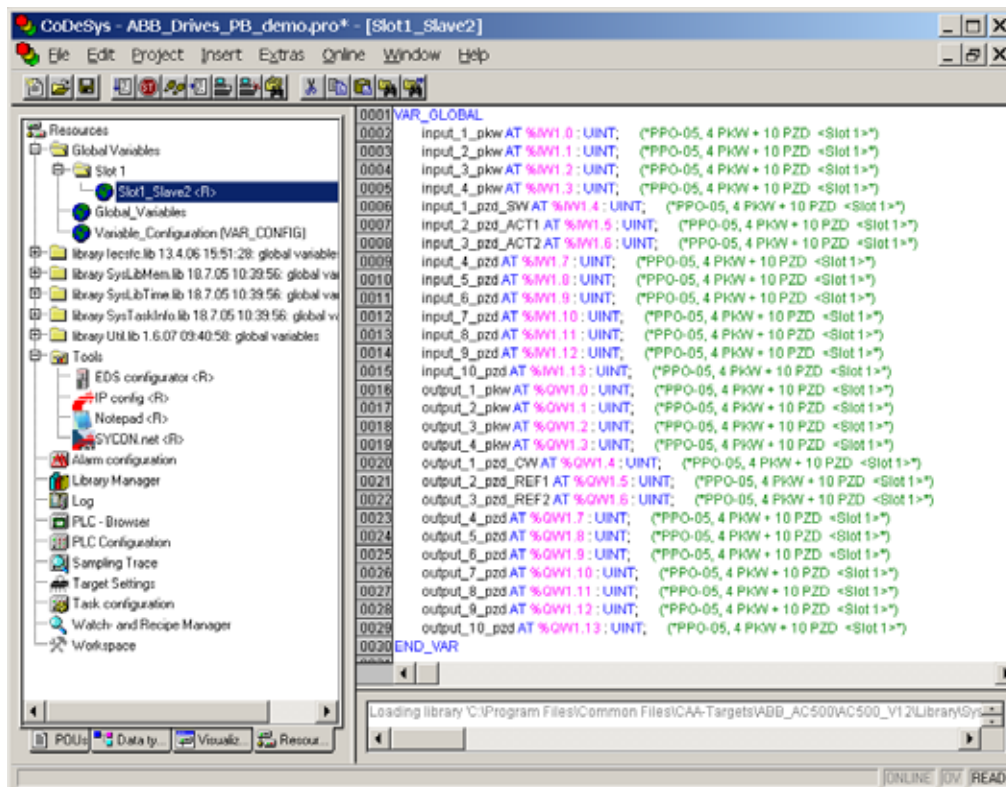
18. When the downloading is completed, right-click the CM572-DPM icon and then click **Disconnect**.
19. Save the project with the **Save** command under the **File** menu.
20. Close the SYCON.net tool.

Tool/Step

Setting up the communication

CoDeSys

21. Declared variables are now in the Resources sheet, under Global variables
-> Slot 1 -> Slot1_Slave2.



Tool/Step

Introduction to the PLC main program

This section introduces the ABB_Drives_PB_demo.pro main program and the global and local variable lists. If you want to modify the ready-made project ABB_Drives_PB_demo.pro, see [How to add function blocks](#) on page 92.

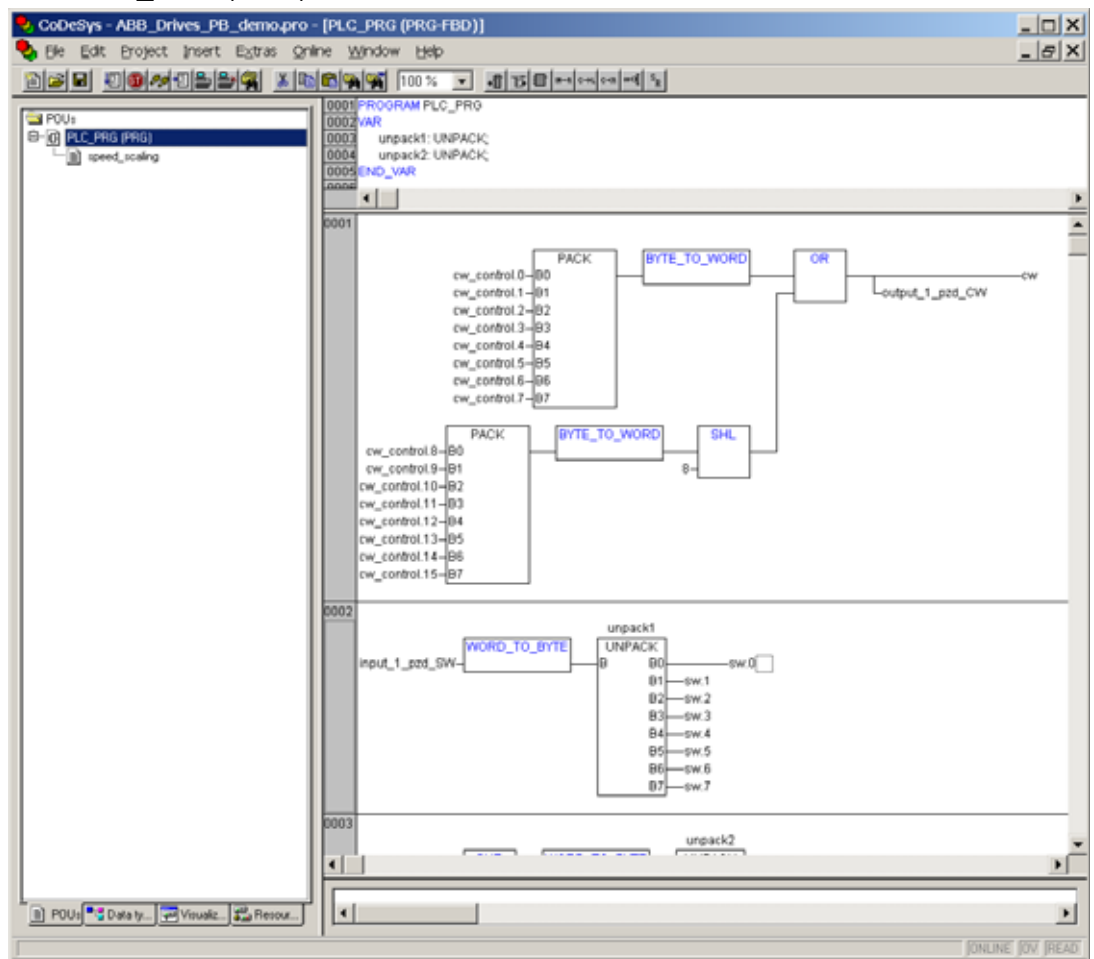
For detailed function block descriptions, refer to

- CoDeSys Online Help (Press F1 in the CoDeSys software)
- *User Manual for PLC Programming with CoDeSys 2.3* by 3S – Smart Software Solutions GmbH

Main program

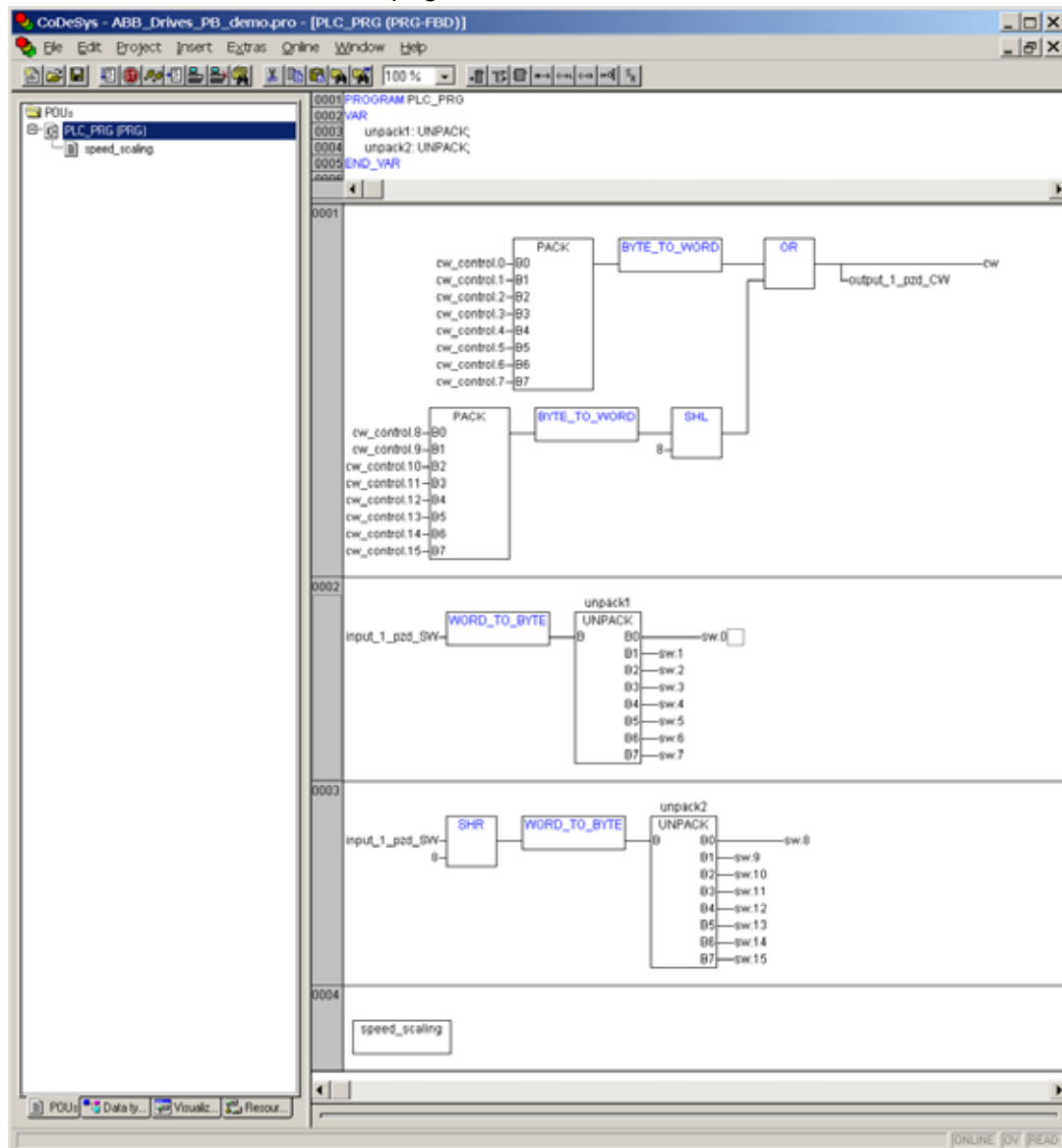
The main program has function blocks that pack Control Word and unpack Status Word, as well as function blocks that declare actions presented in section [Introduction to the actions](#) on page 97.

1. The main program is located under the **POUs** tab. To open the program, double-click PLC_PRG (PRG) under the **POUs** folder.



Tool/Step Introduction to the PLC main program

- The function blocks of the main program on rows 1 to 4 are shown below. The function blocks on rows 1 to 3 show the inputs and outputs of Control Word and Status Word. A function block on row 4 declare action presented in section [Introduction to the actions](#) on page 97.

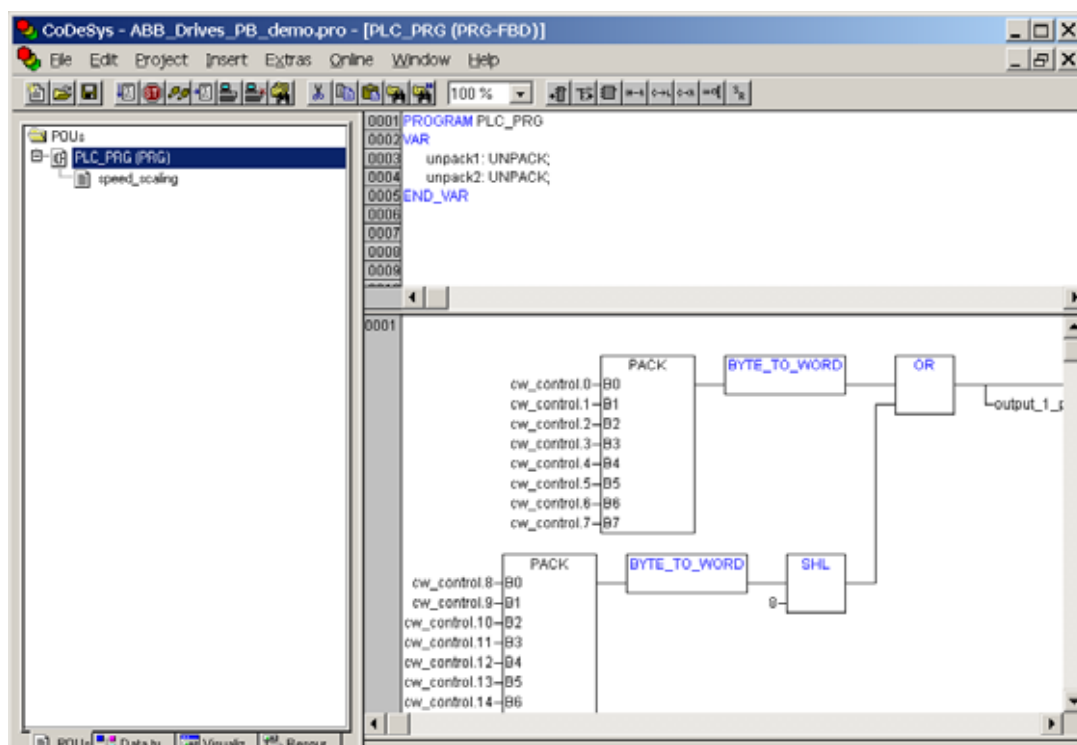


Tool/Step

Introduction to the PLC main program

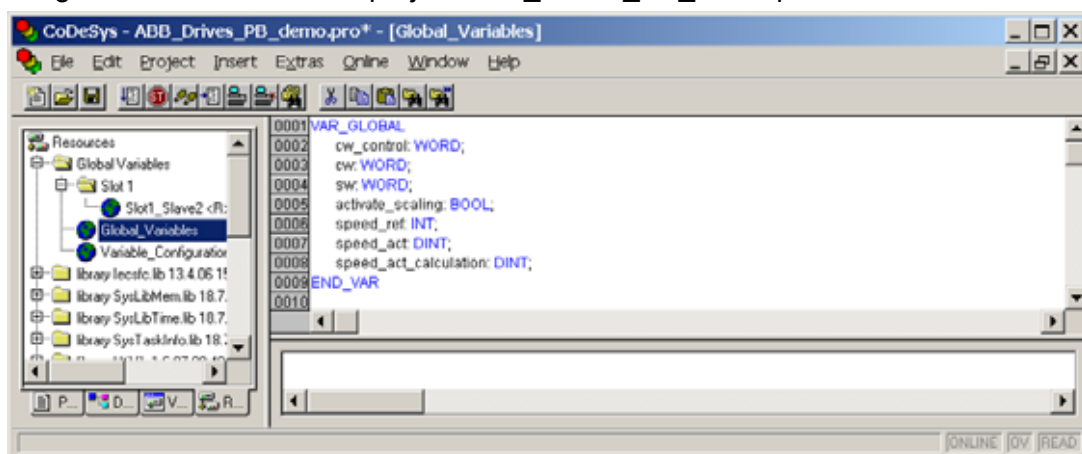
Local variables

Local variables are located above the main program function blocks. The Declare Variable assistant writes variables to the local or global variable list based on your selection. All local variables used in project ABB_Drives_PB_demo.pro are shown below.



Global variables

Global variables are located under the **Resources** tab. The Declare Variable assistant writes variables to the local or global variable list based on your selection. All global variables used in project ABB_Drives_PB_demo.pro are shown below.



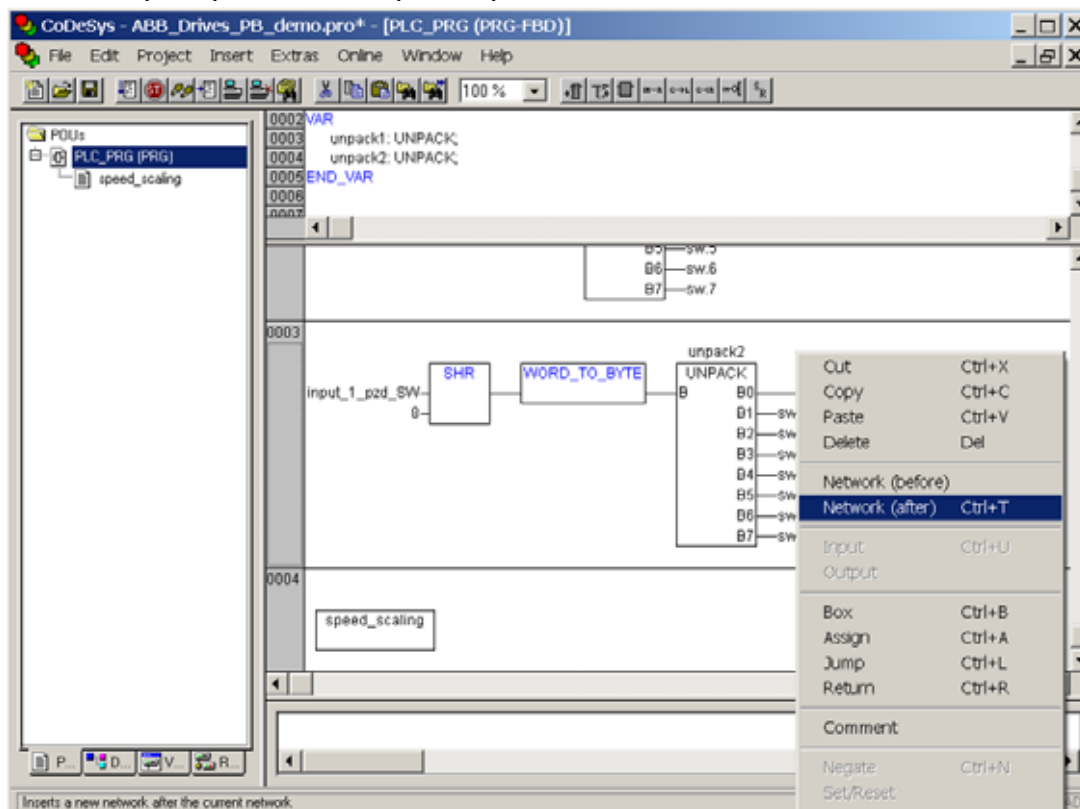
Tool/Step

Introduction to the PLC main program

How to add function blocks

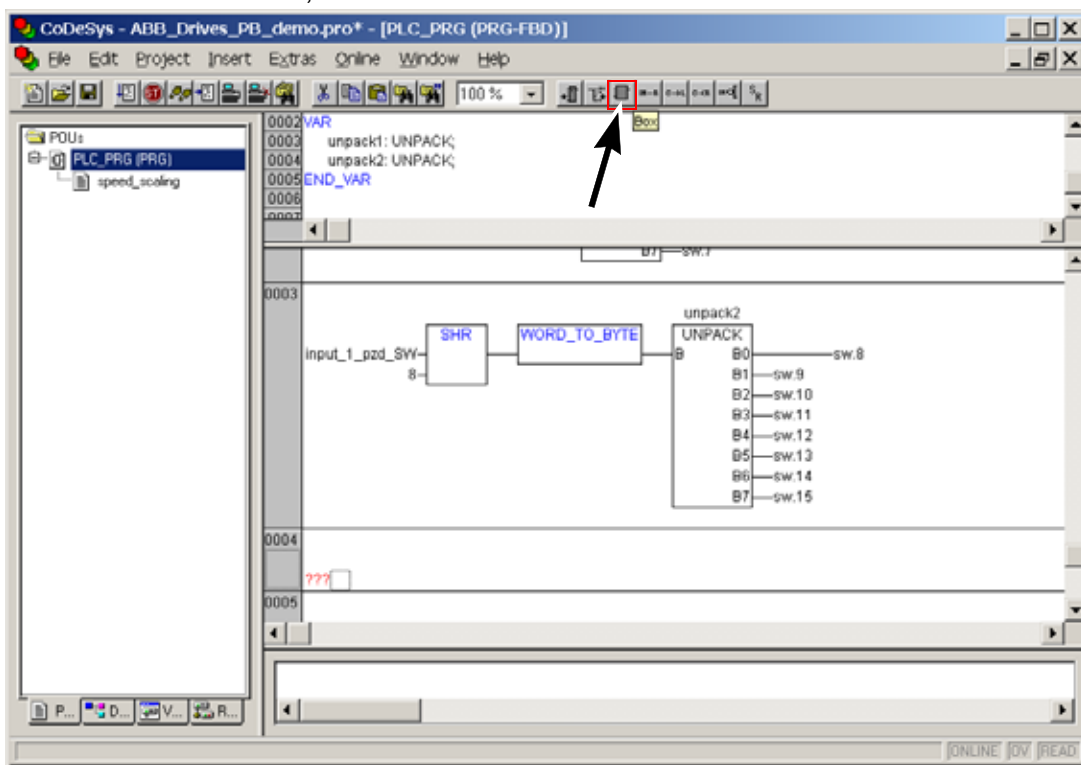
This section instructs you how to add function blocks to the project, if needed. However, it is not necessary for you to modify the project, as it is already functional.

1. To create a new programmable area, right-click on the blank area and select **Network (after) or Network (before)** from the menu.



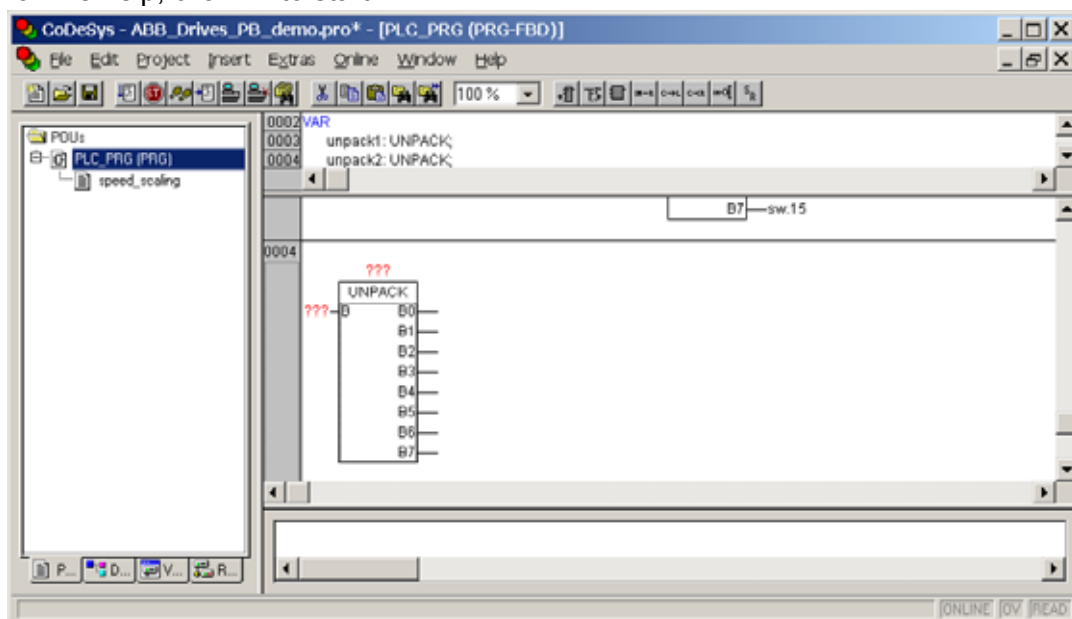
Tool/Step Introduction to the PLC main program

- To add function blocks, click the Box button in the tool bar.



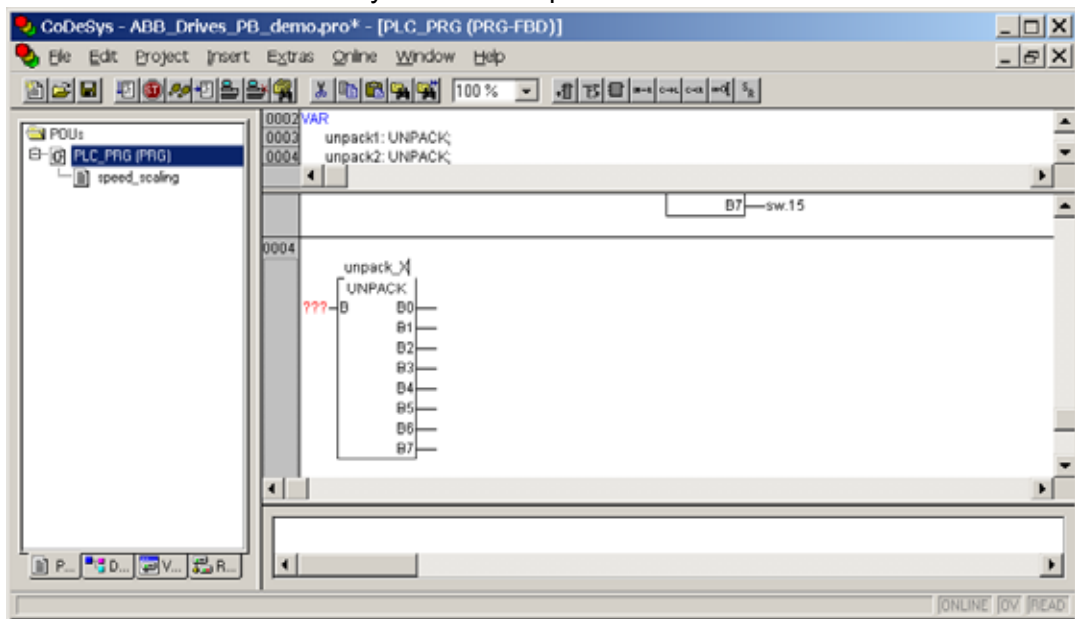
- Replace the default text AND with text “any function block”. The CoDeSys program recognizes the function block and the block appearance changes automatically.

Note: Function block descriptions and other relevant data are available in the online help, click **F1** to start.

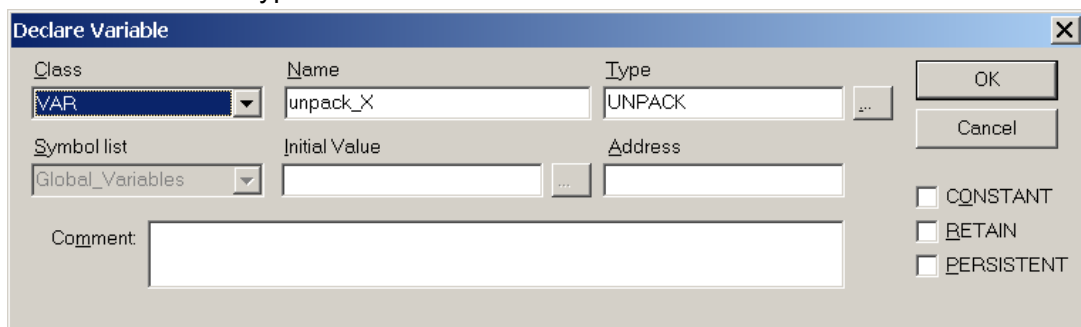


Tool/Step Introduction to the PLC main program

4. Name the function block as you wish and press **Enter**.



5. The Declare Variable assistant appears. In the **Class** dialog box, select the desired variable class. The content of the **Type** box is configured automatically according to the function block type. Click **OK**.

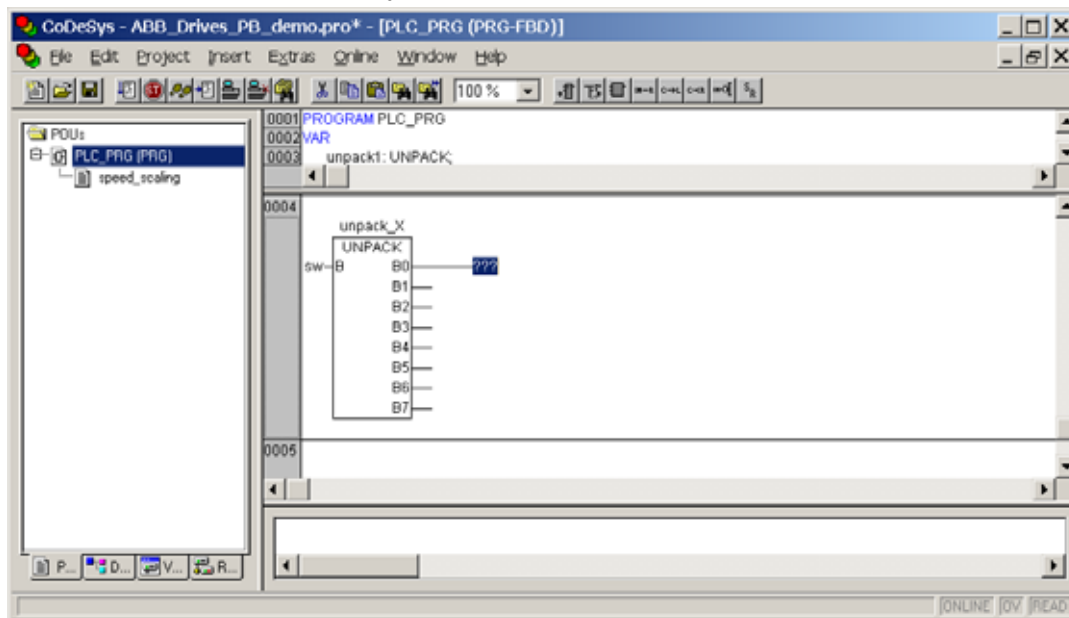


Note: If you want to call the Declare Variable assistant again, click the desired variable and press **Shift+F2**.

Note: When defining inputs, you can use the Input assistant. Click the desired input and press **F2**.

Tool/Step Introduction to the PLC main program

6. Configure inputs and outputs. While naming the inputs, the Declare Variable assistant appears each time you enter an unknown variable.



Introduction to the actions

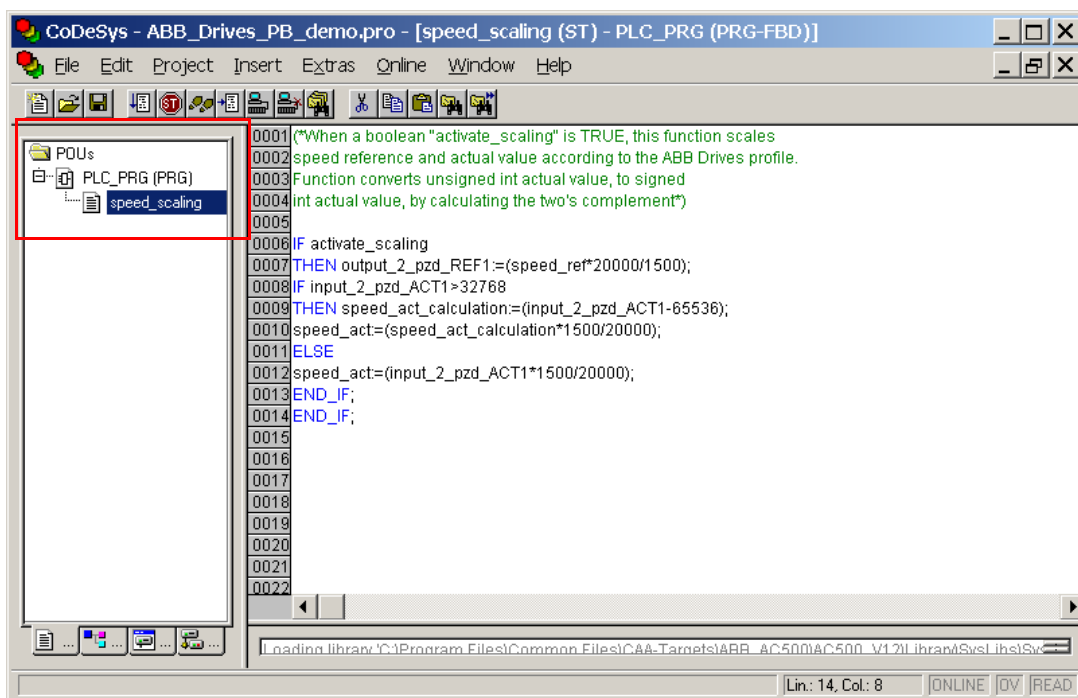
This section presents the scaling action of project ABB_Drives_PB_demo.pro. This action is used for a speed reference and an actual value scaling according to the ABB Drives profile.

At the end of this section, there are also brief instructions [How to create actions](#), in case you want to modify the ready-made project ABB_Drives_PB_demo.pro.

For detailed function block descriptions, refer to

- CoDeSys Online Help (Press F1 in the CoDeSys software)
- *User Manual for PLC Programming with CoDeSys 2.3* by 3S – Smart Software Solutions GmbH.

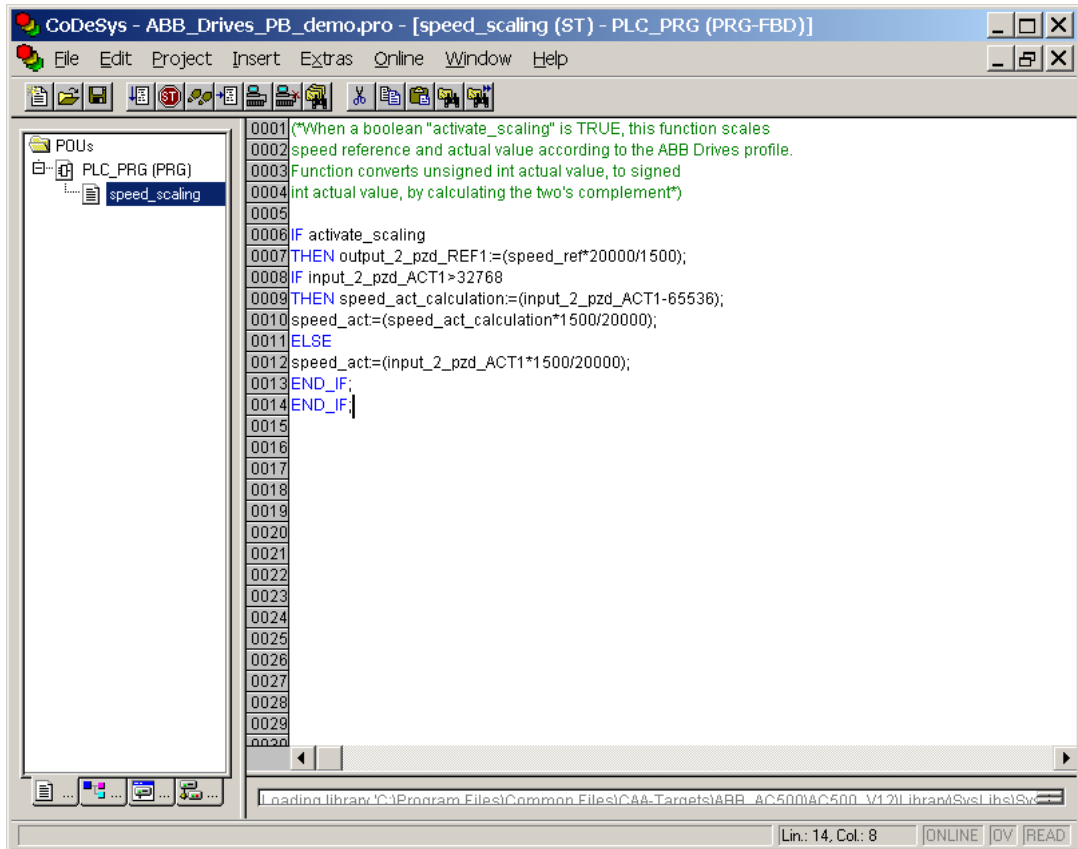
Actions are located under the **POUs** tab under the main program PLC_PRG (PRG), as shown below.



Introduction to the actions

speed_scaling

When a boolean "activate_scaling" is TRUE, action 'speed_scaling' scales the speed reference and the actual value according to the ABB Drives profile. Action converts an unsigned int actual value to a signed int actual value, by calculating the two's complement

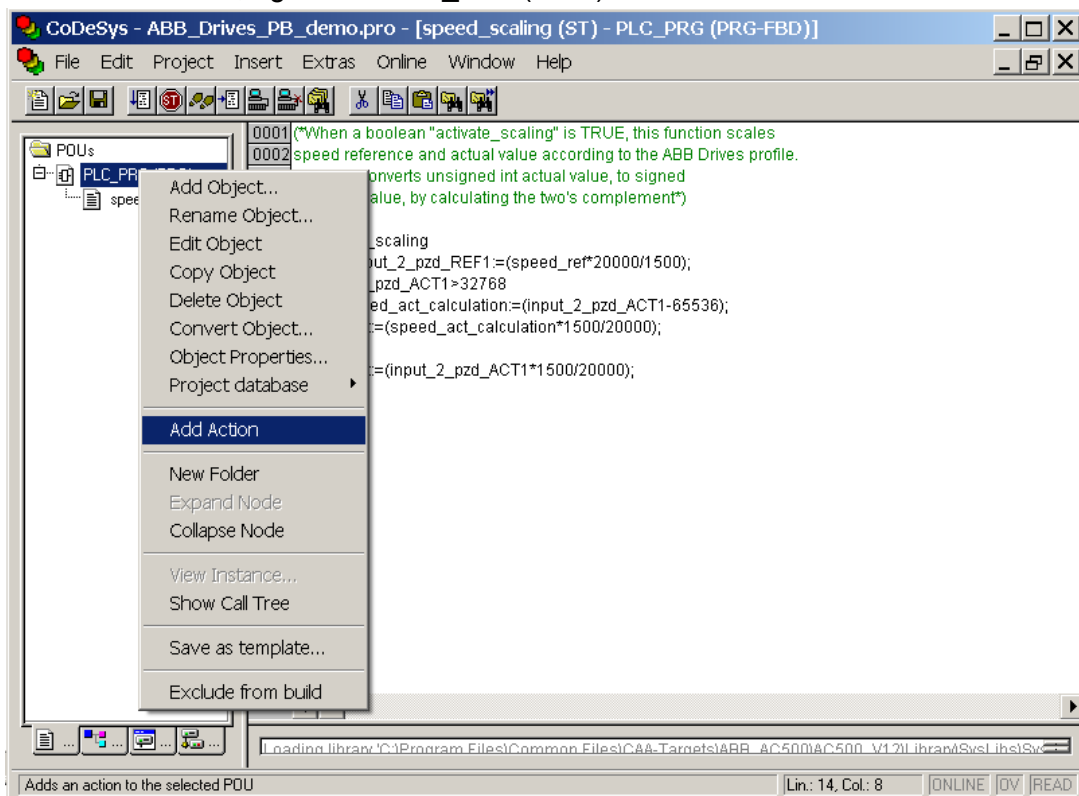


Tool/Step Introduction to the actions

How to create actions

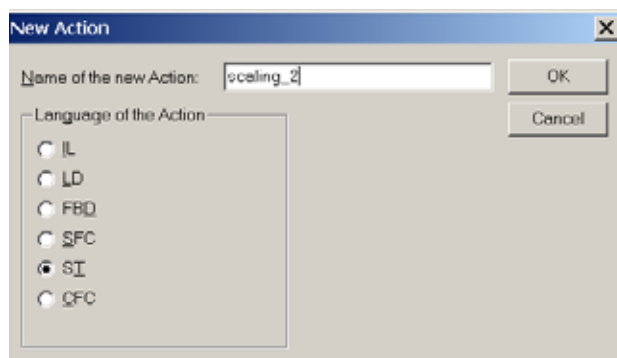
CoDeSys

1. In the **POUs** field, right-click PLC_PRG(PRG) and select **Add Action**.



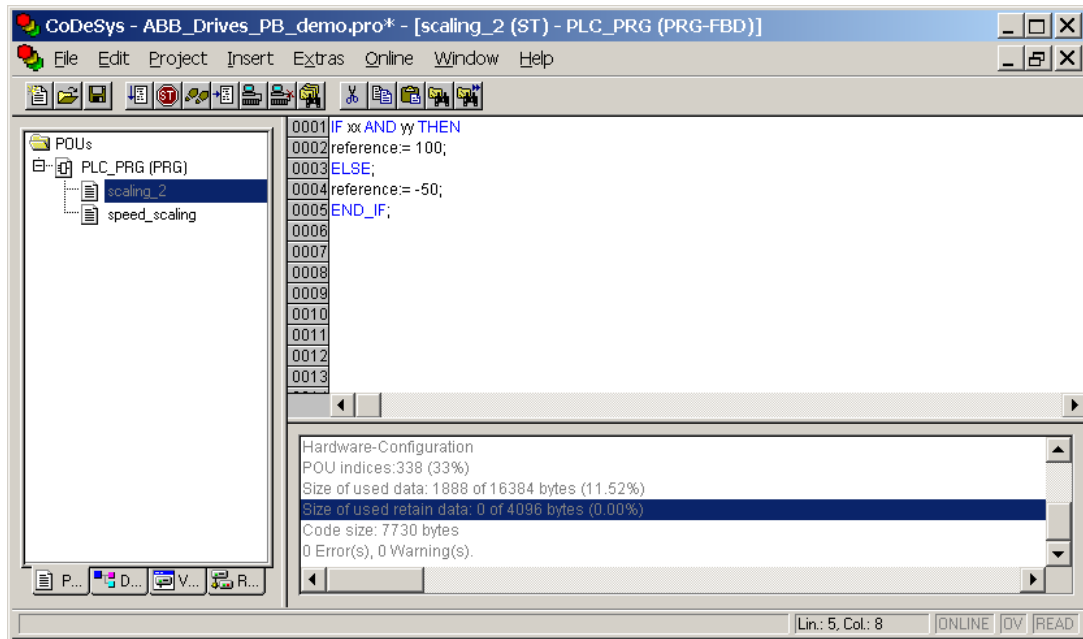
2. Name the action and select the programming language (options below). Click **OK**.

- IL: Instruction list
- LD: Ladder diagram
- FBD: Function block diagram
- SFC: Sequential function chart
- ST: Structured text
- CFC: Continuous function chart

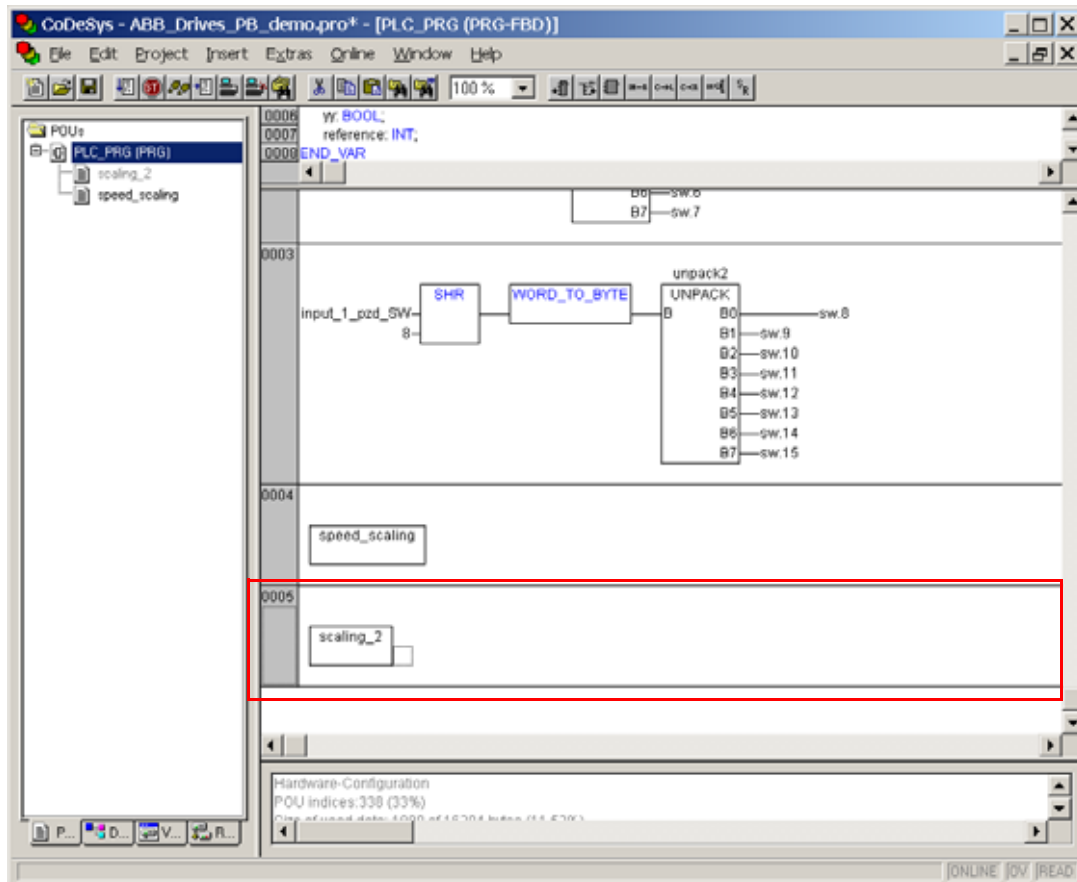


Tool/Step Introduction to the actions

3. An empty programmable space appears. Program the action.



4. Remember to declare all the actions in the main program PLC_PRG.



Introduction to the visualizations

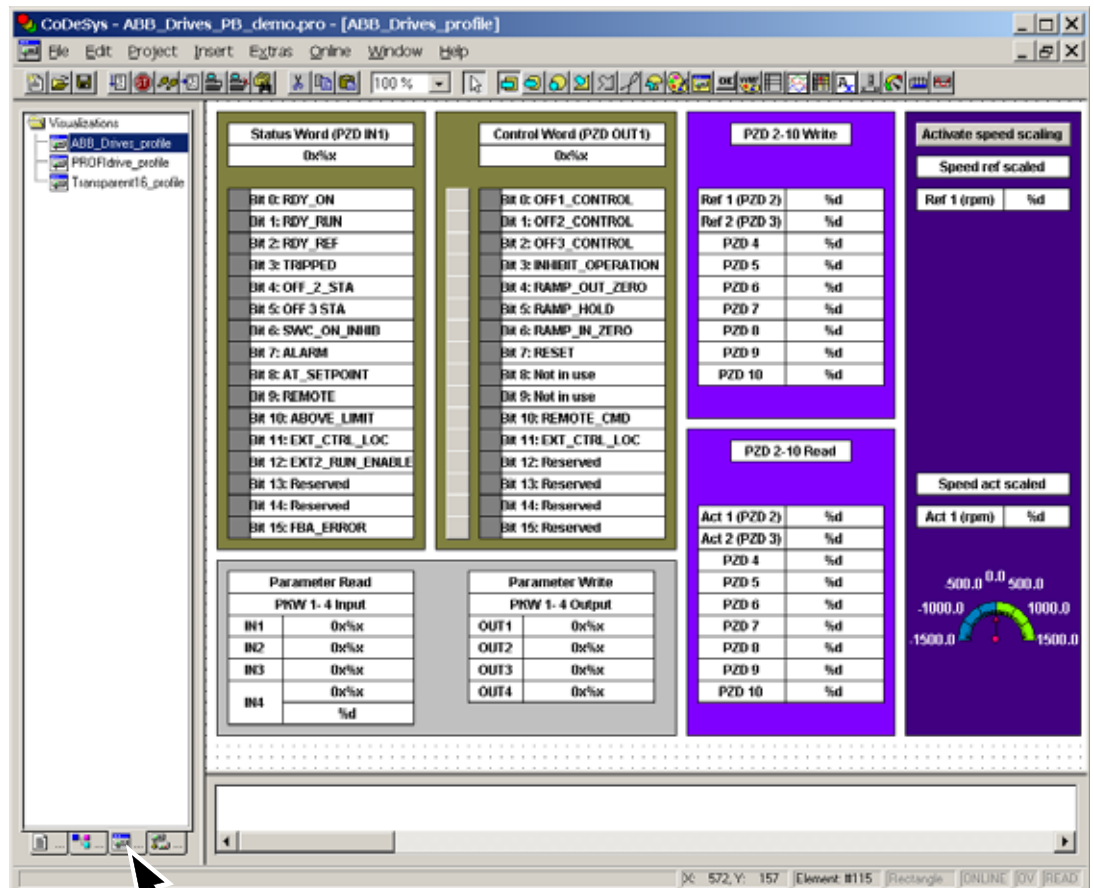
This section presents visualizations. Visualizations are the user interfaces for the PLC program: buttons, switches and indicators for controlling, measuring and viewing the movement.

If you want to modify the ready-made project ABB_Drives_PB_demo.pro, see the following instructions:

- [How to create an empty visualization field](#)
- [How to create and configure buttons](#)
- [How to create indicators](#)

Visualizations are located under the **Visualization** tab, as shown below.

CoDeSys

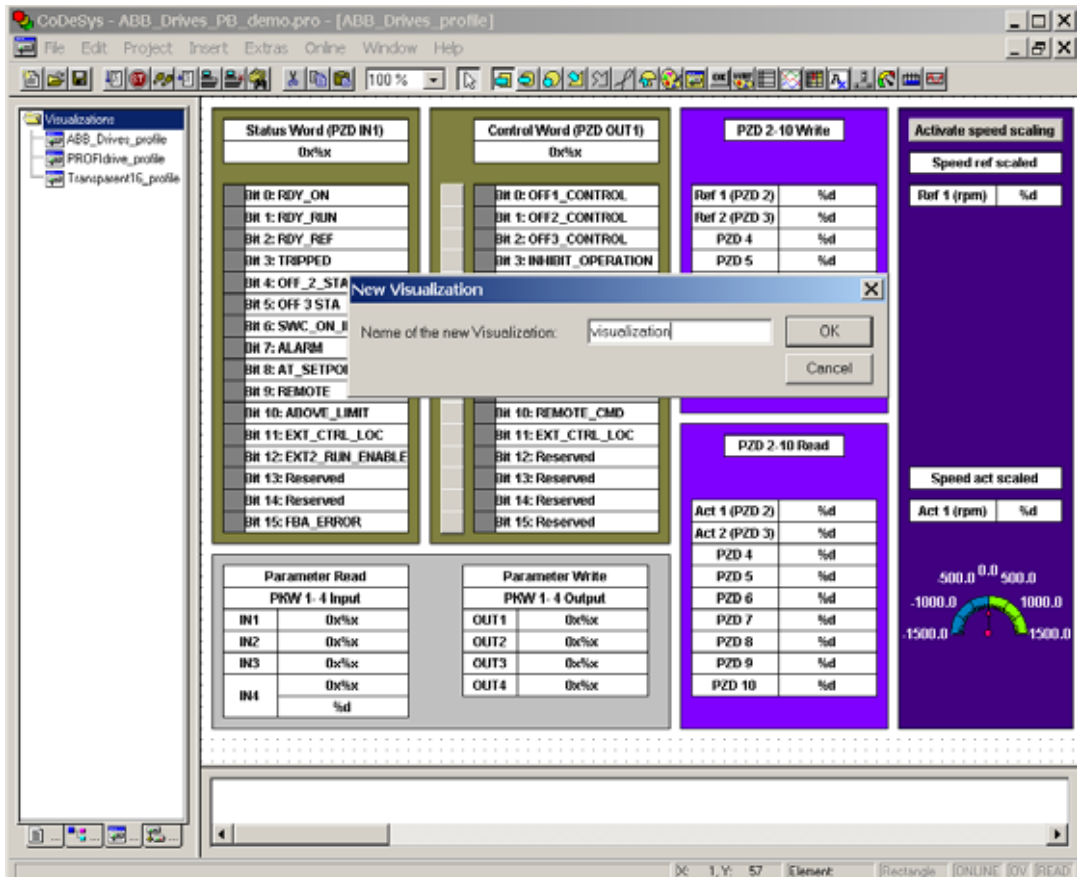


Tool/Step

Introduction to the visualizations

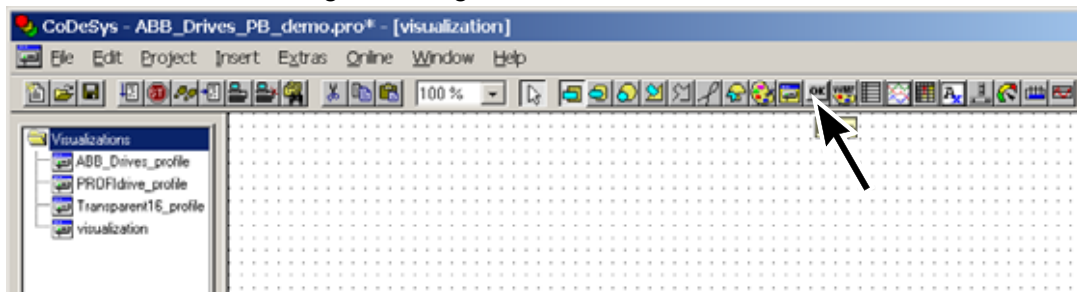
How to create an empty visualization field

Click the **Visualization** tab. Right-click the Visualizations folder. From the menu that opens, select **Add Object...**. Name the new visualization and click **OK**. A platform for the new visualization is created.



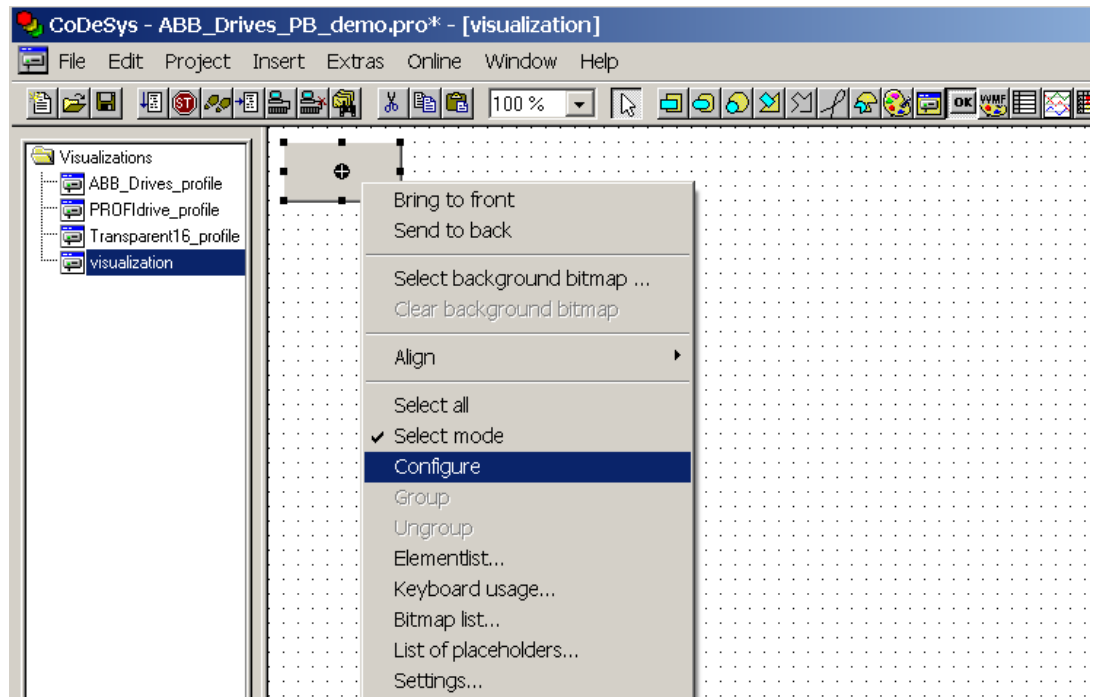
How to create and configure buttons

1. Create buttons for the switches needed. In the upper tool bar, click the **OK** button and, with the cursor, drag a rectangle in the visualization field.

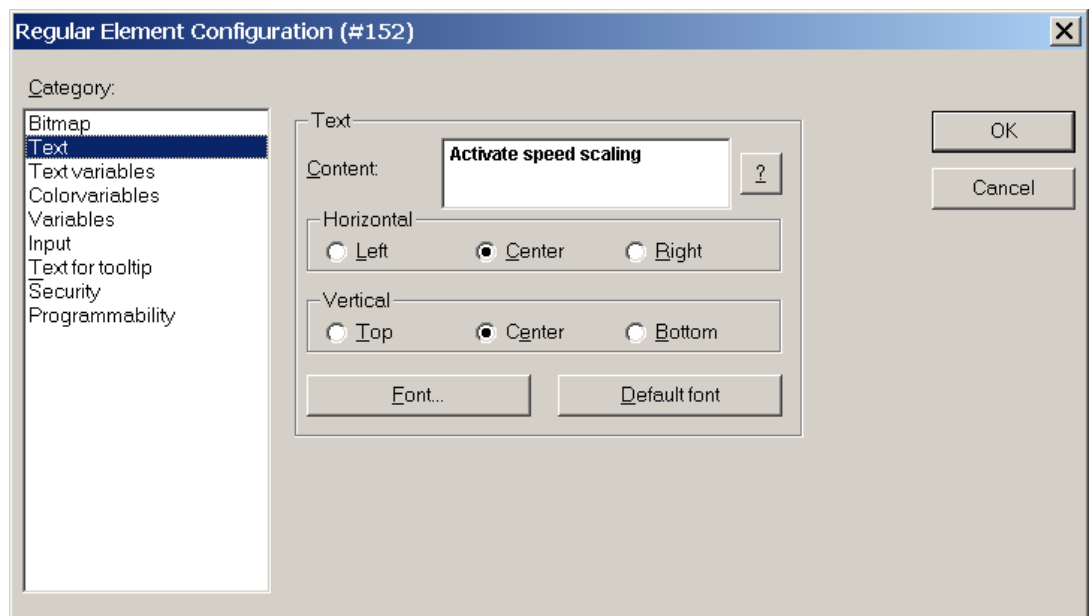


Tool/Step Introduction to the visualizations

2. Configure the button as follows. Right-click the button. From the menu opening, select **Configure**.



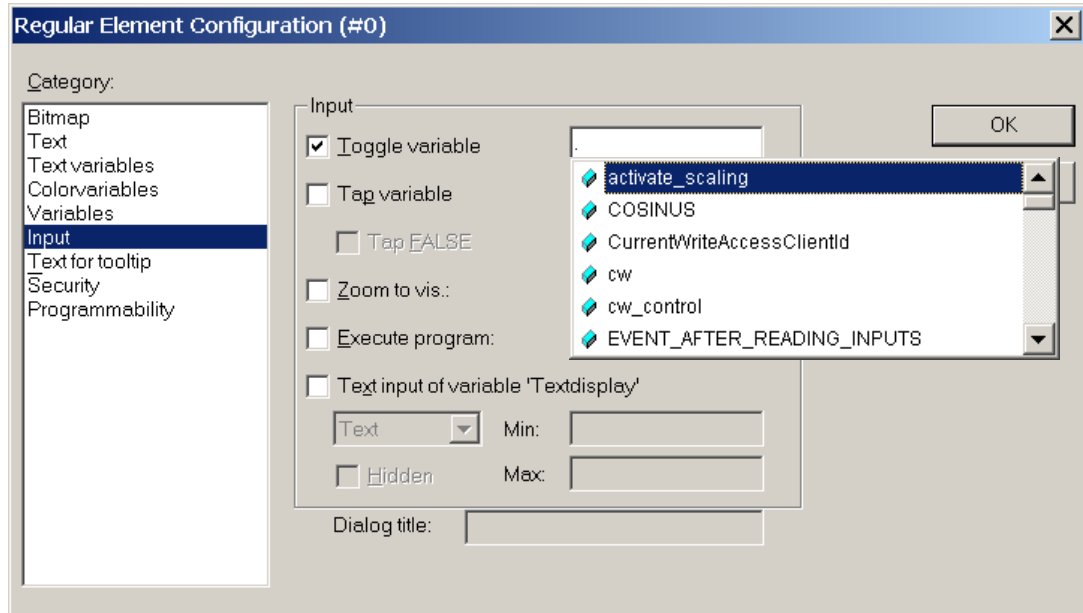
3. In the **Category:** dialog box, select **Text**. In the **Text Content:** dialog box, write a name for the button.



Tool/Step Introduction to the visualizations

4. In the **Category:** dialog box, select **Input**. Under Input, tick Toggle variable or Tap variable and write the name of the input to the dialog box. Click **OK**.

Note: When defining inputs, you can use the Input assistant. Click on Toggle variable field and press **F2**.



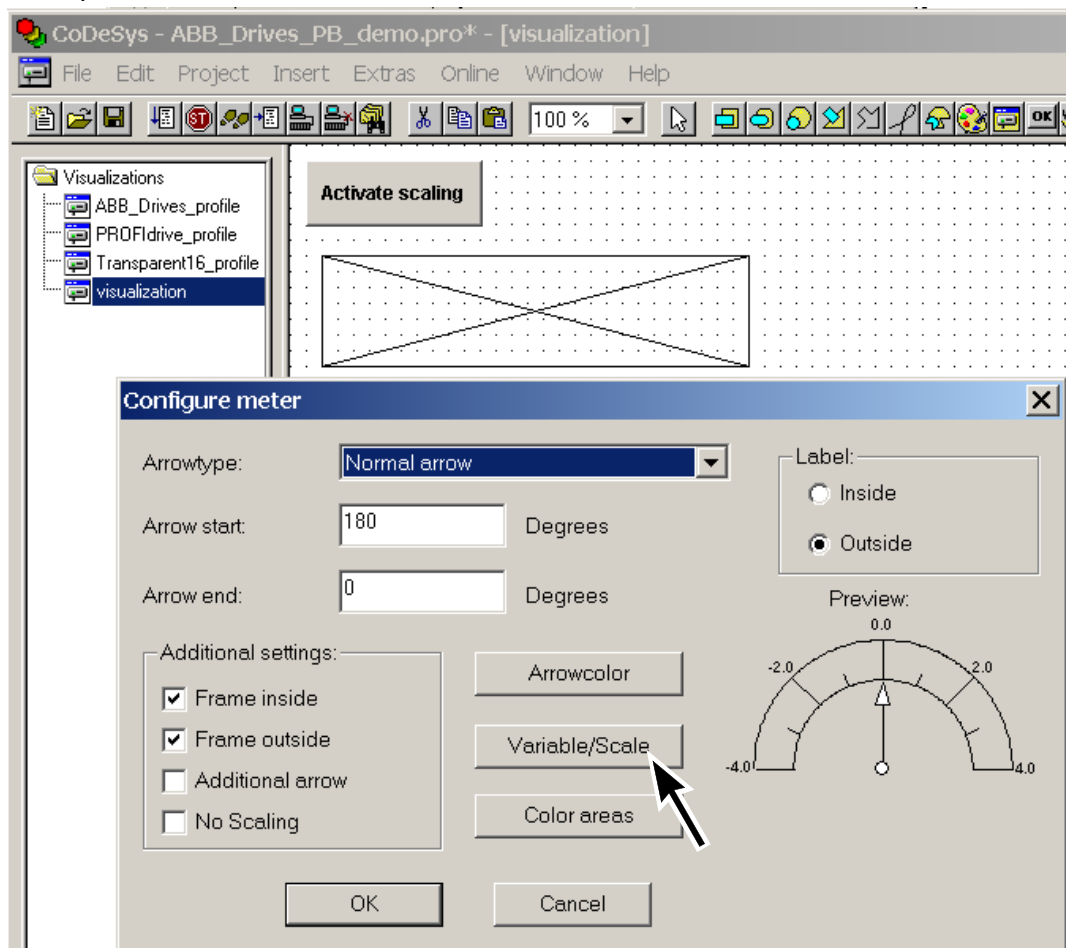
With the button created you can switch the value of a global variable (in this case, `activate_scaling`) between TRUE and FALSE.

Tool/Step

Introduction to the visualizations

How to create indicators

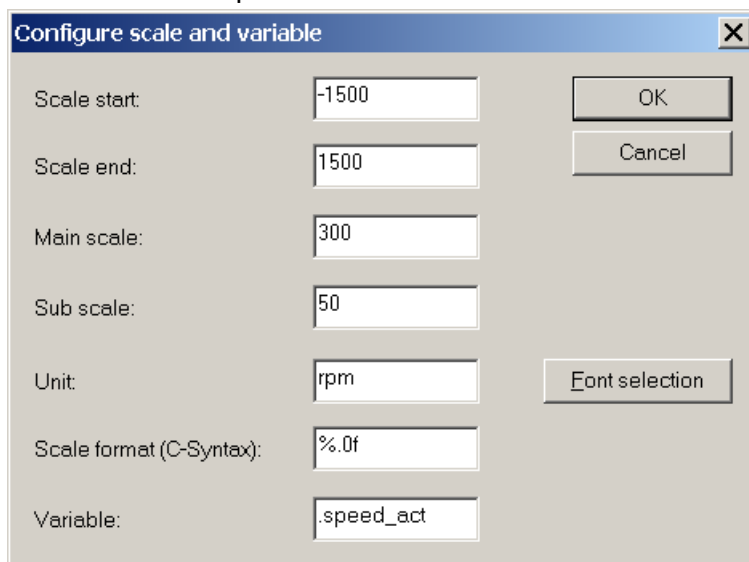
1. A meter indicator is created as follows. In the upper tool bar, click the Meter button and, with the cursor, drag a bar in the visualization field. **Configure meter** dialog box opens. Click the **Variable/Scale** button.



Tool/Step Introduction to the visualizations

2. Set the scale. Write the name of the indicated variable (in this case **Variable:** speed_act). Click **OK** and **OK**. The indicator has been created.

Note: When defining inputs, you can use the Input assistant. Click on Toggle variable field and press **F2**.



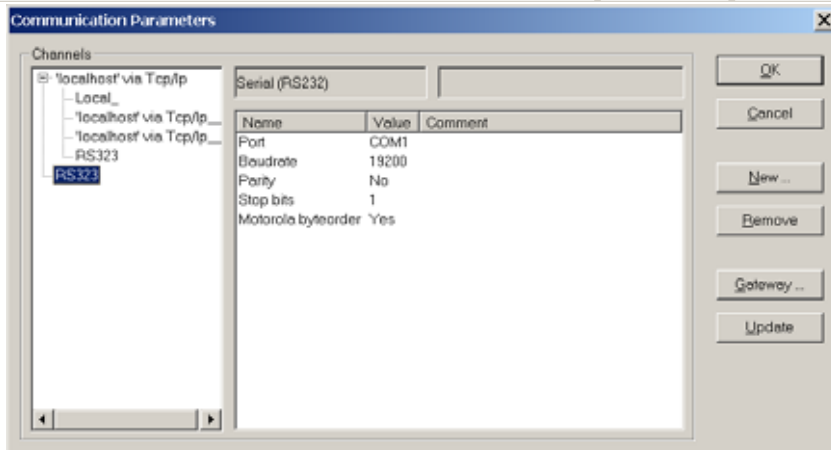
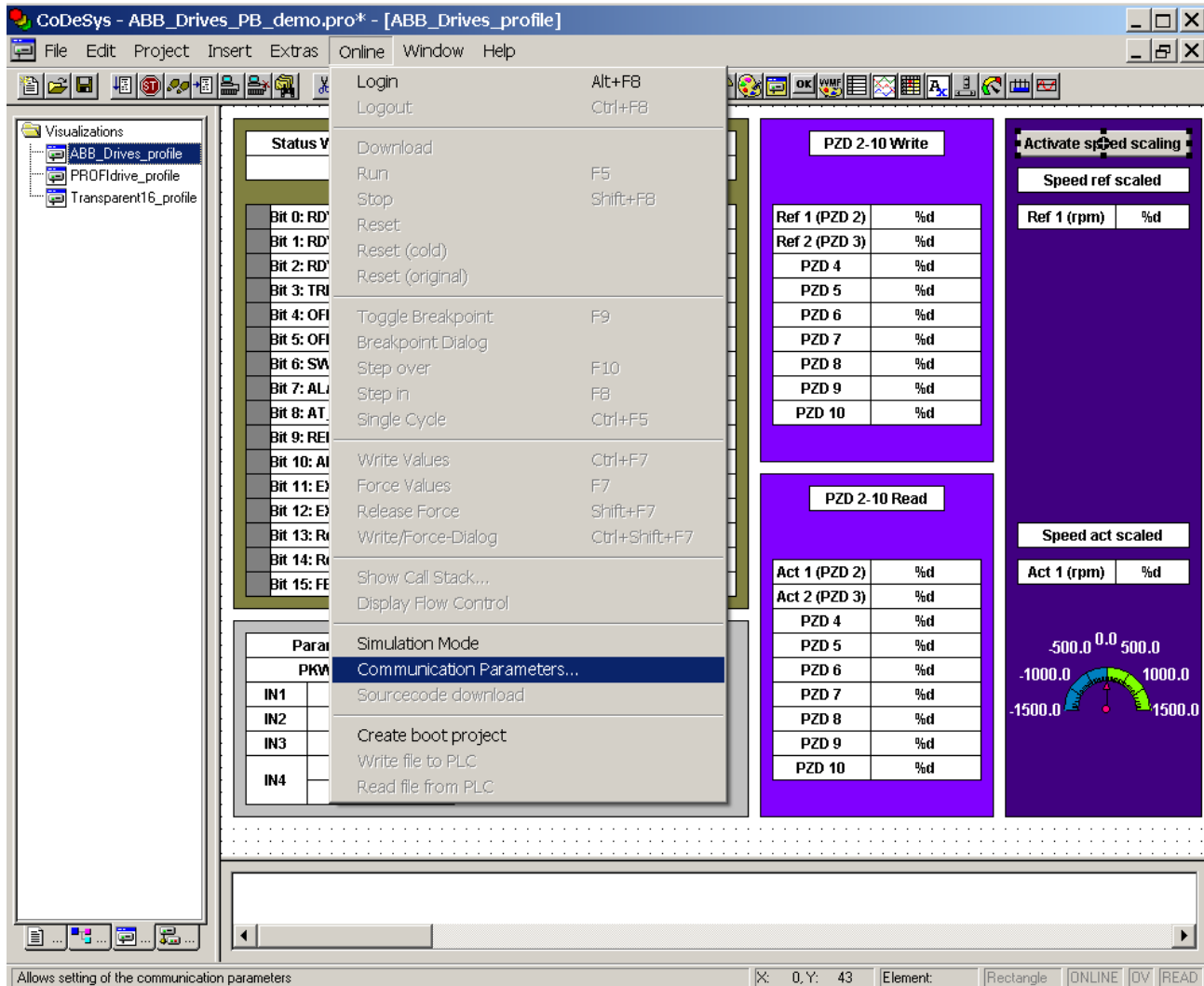
The screenshot shows a dialog box titled "Configure scale and variable" with a close button (X) in the top right corner. The dialog contains several input fields and buttons:

- Scale start:** Input field with the value "-1500".
- Scale end:** Input field with the value "1500".
- Main scale:** Input field with the value "300".
- Sub scale:** Input field with the value "50".
- Unit:** Input field with the value "rpm".
- Scale format (C-Syntax):** Input field with the value "%.0f".
- Variable:** Input field with the value ".speed_act".
- Buttons:** "OK", "Cancel", and "Font selection".

Tool/Step	Running and testing the program
CoDeSys	In this section, you download the program to the PLC. Thereafter, you can run the program and test it.
	 How to download the program to the controller and run the program 1. Check that the AC500 PLC and ACS850 drive are switched on and connections are made properly. See page 61.

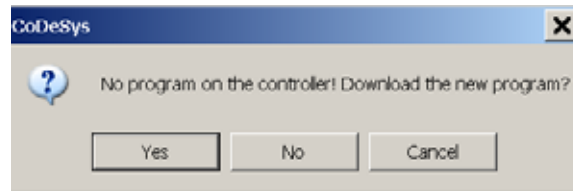
Tool/Step Running and testing the program

- From the **Online** menu, select **Communication Parameters...** Check that the communication parameters correspond to the serial/ethernet port of your PC (see [Appendix A - How to find out the serial communication parameter values of your PC?](#)).

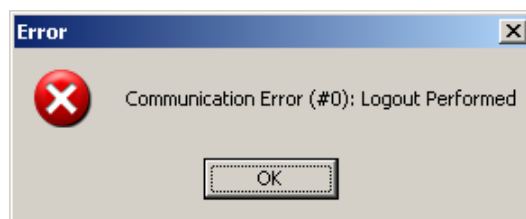


Tool/Step Running and testing the program

3. From the **Online** menu, click **Login**. The program asks you to download the program to the controller. Click **Yes**.



If you get a communication error message, then the connection between the PC and the PLC is not properly established.



Check the cables and connections. From the **Online** menu, select **Communication Parameters...** and remove irrelevant communication parameters. Configure the communication with the SYCON.net again and download the configuration. To find out the communication parameter values of your PC, see [Appendix A - How to find out the serial communication parameter values of your PC?](#)

Tool/Step Running and testing the program

ABB Drives profile; Run at reference speed

1. With DriveStudio, configure drive parameters according to the ABB Drives profile. For parametrization examples for the different communication profiles, see [Installation and parameter setup for communication profiles](#), page 37.

DriveStudio 1.5 - ACS850 {8}{247} - Parameter Browser

File Edit View Drive Parameter Browser Window Help

Reference ():

Fault Logger Wizard

Monitor

Drive status Status word

Name	Value
Motor speed rpm	0.00 rpm
Motor torque	0.0 %
Motor current	0.00 A
Direction	
Fault	FIELD BUS COMM: 45

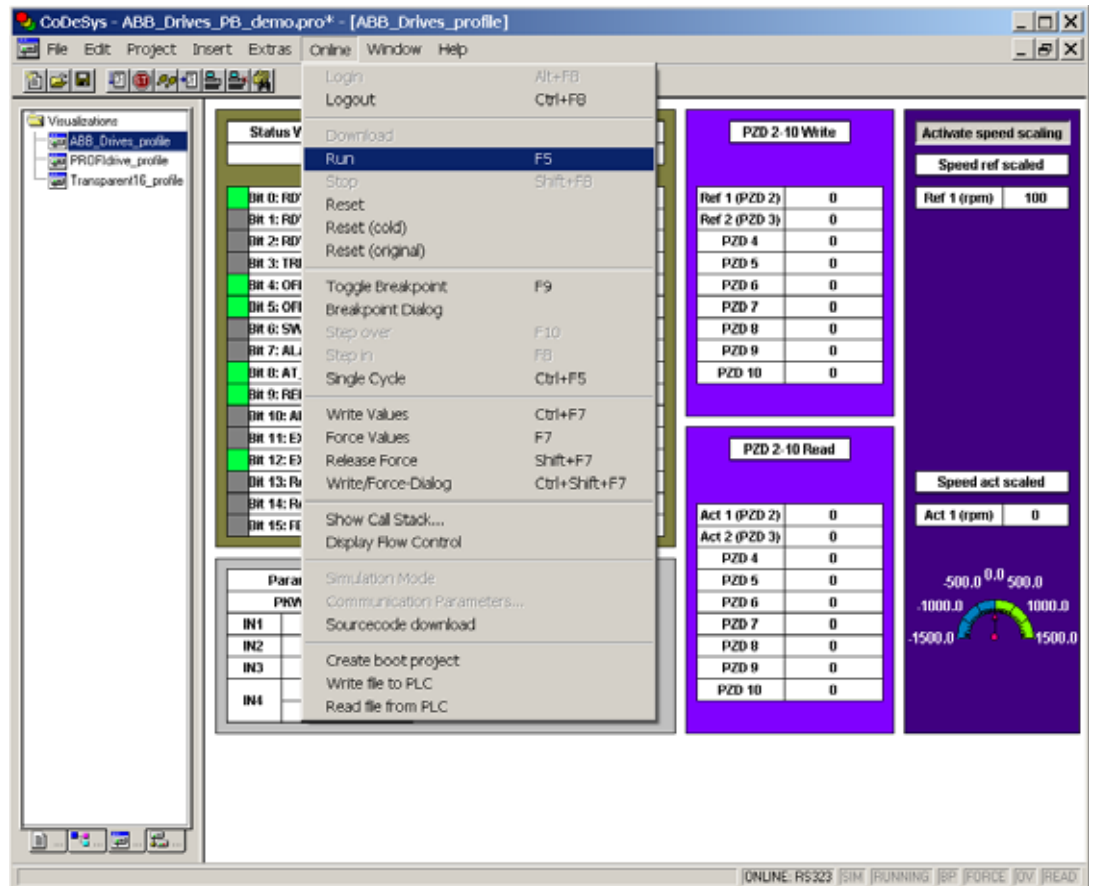
Name	Value	Unit	Min	Max
25 Critical speed				
26 Constant speeds				
27 Process PID				
30 Fault functions				
31 Motor therm prot				
32 Automatic reset				
33 Supervision				
34 User load curve				
35 Process variable				
36 Timed functions				
38 Flux ref				
40 Motor control				
42 Mech brake ctrl				
44 Maintenance				
45 Energy optimising				
47 Voltage ctrl				
48 Brake chopper				
49 Data storage				
50 Fieldbus				
51 FBA settings				
1 FBA type	Profibus-DP		0	65535
2 FBA par2	2		0	65535
3 FBA par3	12000		0	65535
4 FBA par4	5		0	65535
5 FBA par5	1		0	65535
6 FBA par6	1500		0	65535
7 FBA par7	0		0	65535
8 FBA par8	0		0	65535
9 FBA par9	0		0	65535

For Help, press F1

NUM

Tool/Step Running and testing the program

- From the **Online** menu, select **Run**. The program starts running and you can test its features.



Tool/Step Running and testing the program

- Reset any active faults, set Control word bits 7 and 10 to TRUE(1). To set a bit value to TRUE, toggle the gray button next to the bit indicator. The green box next to the button indicates boolean TRUE (1). Control word: 0x480. Status word: 0x380.

CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]

File Edit Project Insert Extras Online Window Help

Visualizations

- ABB_Drives_profile
- PROFIdrive_profile
- Transparent16_profile

Status Word (PZD IN1)
0x380

Bit 0: RDY_ON
Bit 1: RDY_RUN
Bit 2: RDY_REF
Bit 3: TRIPPED
Bit 4: OFF_2_STA
Bit 5: OFF_3 STA
Bit 6: SWC_ON_INHIB
Bit 7: ALARM
Bit 8: AT_SETPOINT
Bit 9: REMOTE
Bit 10: ABOVE_LIMIT
Bit 11: EXT_CTRL_LOC
Bit 12: EXT_RUN_ENABLE
Bit 13: Reserved
Bit 14: Reserved
Bit 15: FBA_ERROR

Control Word (PZD OUT1)
0x480

Bit 0: OFF1_CONTROL
Bit 1: OFF2_CONTROL
Bit 2: OFF3_CONTROL
Bit 3: INHIBIT_OPERATION
Bit 4: RAMP_OUT_ZERO
Bit 5: RAMP_HOLD
Bit 6: RAMP_IN_ZERO
Bit 7: RESET
Bit 8: Not in use
Bit 9: Not in use
Bit 10: REMOTE_CMD
Bit 11: EXT_CTRL_LOC
Bit 12: Reserved
Bit 13: Reserved
Bit 14: Reserved
Bit 15: Reserved

Parameter Read
PKW 1- 4 Input

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0x0

Parameter Write
PKW 1- 4 Output

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

PZD 2-10 Write

Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

PZD 2-10 Read

Act 1 (PZD 2)	0
Act 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Activate speed scaling

Speed ref scaled

Ref 1 (rpm)	0
-------------	---

Speed act scaled

Act 1 (rpm)	0
-------------	---

Speed act scaled gauge: -1500.0 to 1500.0 rpm

ONLINE: RS323 SIM RUNNING BP FORCE JOY READ

Tool/Step Running and testing the program

4. Set the drive ready to turn on. Set following Control word bits to TRUE(1): 10,6,5,4,3,2,1. Control word: 0x47e. Status word: 0x1331.

CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]

File Edit Project Insert Extras Online Window Help

Visualizations

- ABB_Drives_profile
- PROFIdrive_profile
- Transparent16_profile

Status Word (PZD IN1)
0x1331

Bit 0: RDY_ON	
Bit 1: RDY_RUN	
Bit 2: RDY_REF	
Bit 3: TRIPPED	
Bit 4: OFF_2_STA	
Bit 5: OFF_3_STA	
Bit 6: SWC_ON_INHIB	
Bit 7: ALARM	
Bit 8: AT_SETPOINT	
Bit 9: REMOTE	
Bit 10: ABOVE_LIMIT	
Bit 11: EXT_CTRL_LOC	
Bit 12: EXT2_RUN_ENABLE	
Bit 13: Reserved	
Bit 14: Reserved	
Bit 15: FBA_ERROR	

Control Word (PZD OUT1)
0x47e

Bit 0: OFF1_CONTROL	
Bit 1: OFF2_CONTROL	
Bit 2: OFF3_CONTROL	
Bit 3: INHIBIT_OPERATION	
Bit 4: RAMP_OUT_ZERO	
Bit 5: RAMP_HOLD	
Bit 6: RAMP_IN_ZERO	
Bit 7: RESET	
Bit 8: Not in use	
Bit 9: Not in use	
Bit 10: REMOTE_CMD	
Bit 11: EXT_CTRL_LOC	
Bit 12: Reserved	
Bit 13: Reserved	
Bit 14: Reserved	
Bit 15: Reserved	

PZD 2-10 Write

Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

PZD 2-10 Read

Act 1 (PZD 2)	0
Act 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Parameter Read
PKW 1- 4 Input

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0x0

Parameter Write
PKW 1- 4 Output

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

Activate speed scaling

Speed ref scaled

Ref 1 (rpm)	0
-------------	---

Speed act scaled

Act 1 (rpm)	0
-------------	---

-500.0 0.0 500.0
-1000.0 1000.0
-1500.0 1500.0

ONLINE: RS323 SIM RUNNING BP FORCE OV READ

Tool/Step Running and testing the program

5. Start modulation: set the following Control word bits to TRUE(1): 10,6,5,4,3,2,1,0.
Control word: 0x47f. Status word: 0x1337.

CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]

File Edit Project Insert Extras Online Window Help

Visualizations

- ABB_Drives_profile
- PROFIdrive_profile
- Transparent16_profile

Status Word (PZD IN1)
0x1337

Bit 0: RDY_ON	1
Bit 1: RDY_RUN	1
Bit 2: RDY_REF	1
Bit 3: TRIPPED	0
Bit 4: OFF_2_STA	1
Bit 5: OFF_3_STA	1
Bit 6: SWC_ON_INHIB	1
Bit 7: ALARM	0
Bit 8: AT_SETPOINT	1
Bit 9: REMOTE	1
Bit 10: ABOVE_LIMIT	1
Bit 11: EXT_CTRL_LOC	0
Bit 12: EXT2_RUN_ENABLE	1
Bit 13: Reserved	0
Bit 14: Reserved	0
Bit 15: FBA_ERROR	0

Control Word (PZD OUT1)
0x47f

Bit 0: OFF1_CONTROL	1
Bit 1: OFF2_CONTROL	1
Bit 2: OFF3_CONTROL	1
Bit 3: INHIBIT_OPERATION	1
Bit 4: RAMP_OUT_ZERO	1
Bit 5: RAMP_HOLD	1
Bit 6: RAMP_IN_ZERO	1
Bit 7: RESET	0
Bit 8: Not in use	0
Bit 9: Not in use	0
Bit 10: REMOTE_CMD	1
Bit 11: EXT_CTRL_LOC	0
Bit 12: Reserved	0
Bit 13: Reserved	0
Bit 14: Reserved	0
Bit 15: Reserved	0

Parameter Read
PKW 1- 4 Input

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0x0

Parameter Write
PKW 1- 4 Output

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

PZD 2-10 Write

Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

PZD 2-10 Read

Act 1 (PZD 2)	145
Act 2 (PZD 3)	63208
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Activate speed scaling

Speed ref scaled

Ref 1 (rpm)	0
-------------	---

Speed act scaled

Act 1 (rpm)	0
-------------	---

Speed Gauge
-1500.0 0.0 500.0 1000.0 1500.0

ONLINE: RS323 SIM RUNNING BP FORCE OV READ

Tool/Step Running and testing the program

6. The project contains a scaling function for the ABB Drives profile. The speed scaling function enables entering a reference speed in rpm. To activate speed scaling, toggle button: **Activate speed scaling**. Insert desired reference speed to **Ref 1 (rpm)** field and press enter. The drive ramps up to the reference speed. You can monitor the actual speed in the **Act 1 (rpm)** field and also from speedometer below the field. You can monitor the actual cyclic data flow over fieldbus in **PZD 2-10** areas.

CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]

File Edit Project Insert Extras Online Window Help

Visualizations

- ABB_Drives_profile
- PROFIdrive_profile
- Transparent16_profile

Status Word (PZD IN1) 0x1337

Bit 0: RDY_ON	Bit 1: RDY_RUN	Bit 2: RDY_REF	Bit 3: TRIPPED	Bit 4: OFF_2_STA	Bit 5: OFF_3_STA	Bit 6: SWC_ON_INHIB	Bit 7: ALARM	Bit 8: AT_SETPOINT	Bit 9: REMOTE	Bit 10: ABOVE_LIMIT	Bit 11: EXT_CTRL_LOC	Bit 12: EXT2_RUN_ENABLE	Bit 13: Reserved	Bit 14: Reserved	Bit 15: FBA_ERROR
---------------	----------------	----------------	----------------	------------------	------------------	---------------------	--------------	--------------------	---------------	---------------------	----------------------	-------------------------	------------------	------------------	-------------------

Control Word (PZD OUT1) 0x47f

Bit 0: OFF1_CONTROL	Bit 1: OFF2_CONTROL	Bit 2: OFF3_CONTROL	Bit 3: INHIBIT_OPERATION	Bit 4: RAMP_OUT_ZERO	Bit 5: RAMP_HOLD	Bit 6: RAMP_IN_ZERO	Bit 7: RESET	Bit 8: Not in use	Bit 9: Not in use	Bit 10: REMOTE_CMD	Bit 11: EXT_CTRL_LOC	Bit 12: Reserved	Bit 13: Reserved	Bit 14: Reserved	Bit 15: Reserved
---------------------	---------------------	---------------------	--------------------------	----------------------	------------------	---------------------	--------------	-------------------	-------------------	--------------------	----------------------	------------------	------------------	------------------	------------------

Parameter Read

PKW 1- 4 Input	
IN1	0x0
IN2	0x0
IN3	0x0
IN4	0x0

Parameter Write

PKW 1- 4 Output	
OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

PZD 2-10 Write

Ref 1 (PZD 2)	8000
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

PZD 2-10 Read

Act 1 (PZD 2)	8033
Act 2 (PZD 3)	65393
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Activate speed scaling

Speed ref scaled

Ref 1 (rpm)	600
-------------	-----

Speed act scaled

Act 1 (rpm)	602
-------------	-----

Speedometer: -500.0 0.0 500.0, -1000.0 1000.0, -1500.0 1500.0

ONLINE: RS323 SIM RUNNING BP FORCE OV READ

Tool/Step

Running and testing the program

ABB Drives profile; Stopping

1. ABB Drives profile state machine defines actions to take, when disabling certain bits of the Control word. When the drive is running at reference speed, you can test different stop modes by disabling each Control word bit at a time:

Bit 0: Stop along currently active deceleration ramp, ACS850 parameter 22.03 or 22.05. Proceed to OFF1 ACTIVE; proceed to READY SWITCH-ON, unless other interlocks (OFF2, OFF3) are active. CW: 0x47e, SW: 0x1231.

The screenshot displays the CoDeSys software interface for the ABB Drives profile. The main window is titled "CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]". The interface is divided into several sections:

- Status Word (PZD IN1):** Shows the current status word as 0x1231. The bits are listed as follows:

Bit 0: RDY_ON	Green
Bit 1: RDY_RUN	Grey
Bit 2: RDY_REF	Grey
Bit 3: TRIPPED	Grey
Bit 4: OFF_2_STA	Green
Bit 5: OFF_3_STA	Green
Bit 6: SWC_ON_INHIB	Grey
Bit 7: ALARM	Grey
Bit 8: AT_SETPOINT	Grey
Bit 9: REMOTE	Green
Bit 10: ABOVE_LIMIT	Grey
Bit 11: EXT_CTRL_LOC	Green
Bit 12: EXT_RUN_ENABLE	Green
Bit 13: Reserved	Grey
Bit 14: Reserved	Grey
Bit 15: FDA_ERROR	Grey
- Control Word (PZD OUT1):** Shows the current control word as 0x47e. The bits are listed as follows:

Bit 0: OFF1_CONTROL	Red
Bit 1: OFF2_CONTROL	Green
Bit 2: OFF3_CONTROL	Green
Bit 3: INHIBIT_OPERATION	Green
Bit 4: RAMP_OUT_ZERO	Green
Bit 5: RAMP_HOLD	Green
Bit 6: RAMP_IN_ZERO	Green
Bit 7: RESET	Green
Bit 8: Not in use	Grey
Bit 9: Not in use	Grey
Bit 10: REMOTE_CMD	Green
Bit 11: EXT_CTRL_LOC	Green
Bit 12: Reserved	Grey
Bit 13: Reserved	Grey
Bit 14: Reserved	Grey
Bit 15: Reserved	Grey
- PZD 2-10 Write:** Shows the current values for PZD 2-10.

Ref 1 (PZD 2)	8000
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0
- PZD 2-10 Read:** Shows the current values for PZD 2-10.

Act 1 (PZD 2)	0
Act 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0
- Parameter Read:** Shows the current values for PKW 1-4 Input.

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0
- Parameter Write:** Shows the current values for PKW 1-4 Output.

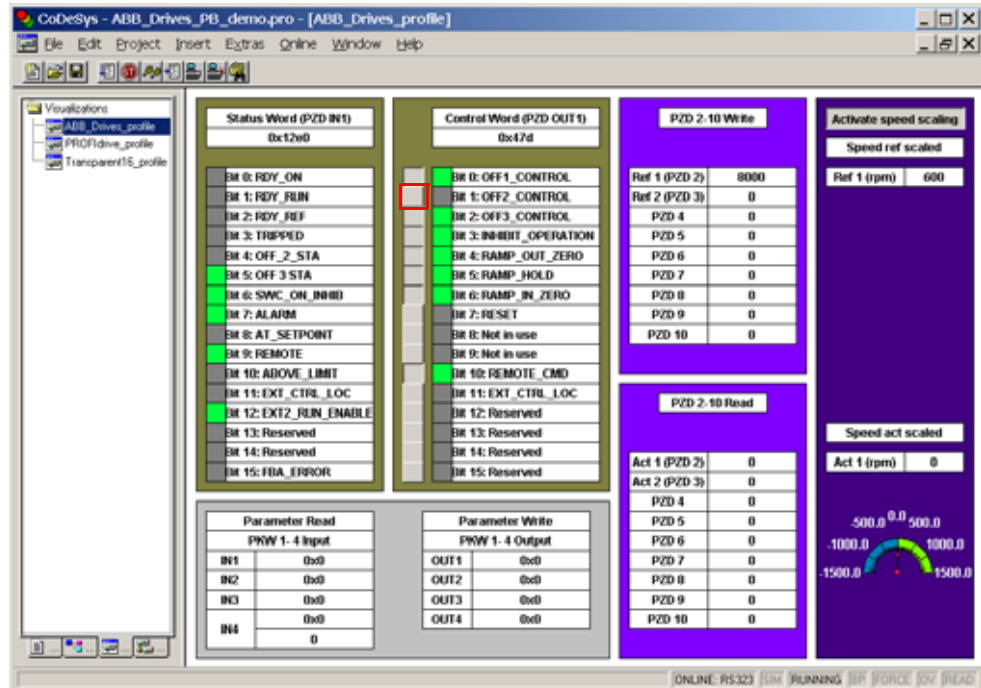
OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0
- Activate speed scaling:** Shows the current speed reference and actual speed.

Speed ref scaled	Ref 1 (rpm)	600
Speed act scaled	Act 1 (rpm)	0

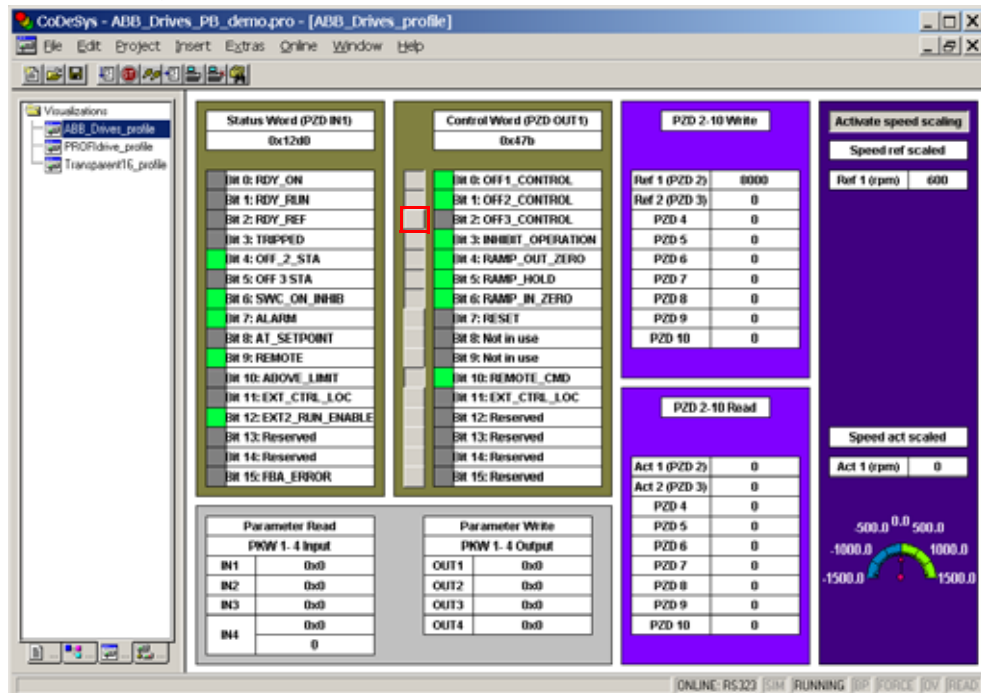
The interface also includes a speed gauge at the bottom right, showing a range from -1500.0 to 1500.0 rpm, with a current reading of 0.0 rpm. The status bar at the bottom indicates "ONLINE: RS323 [SIM] RUNNING [BP] FORCE [OV] READ".

Tool/Step Running and testing the program

2. **Bit 1:** Emergency OFF, coast to stop. Proceed OFF2 active; proceed to SWITCH-ON INHIBITED. CW: 0x47d, SW: 0x12e0.

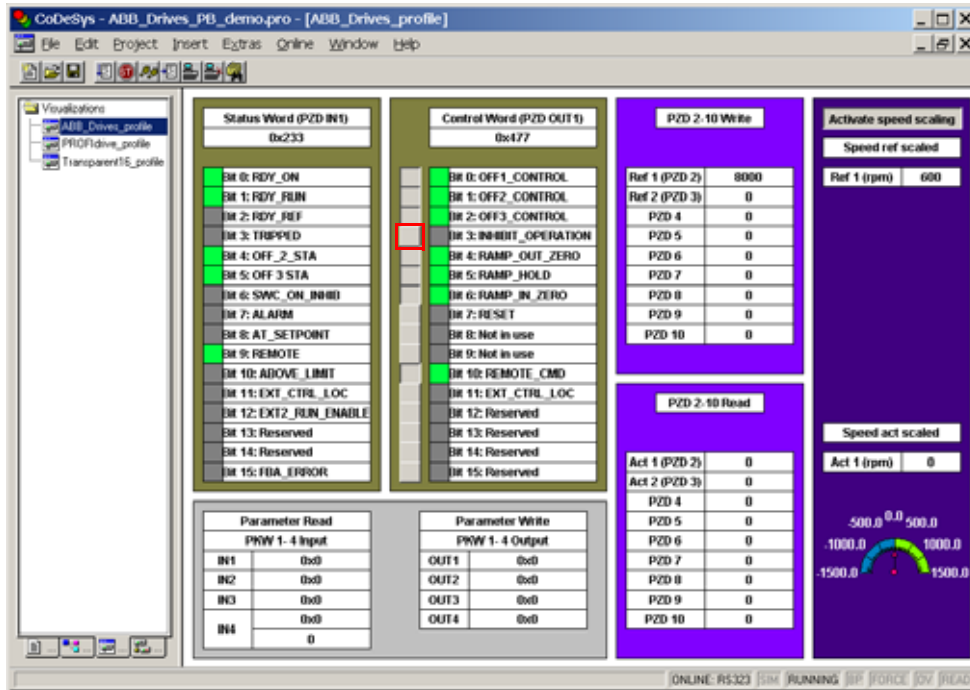


3. **Bit 2:** Emergency stop, according emergency stop ramp, defined by ACS850 parameter 22.12. Proceed to OFF3 ACTIVE; proceed to SWITCH-ON INHIBITED. CW: 0x47b, SW: 0x12d0.

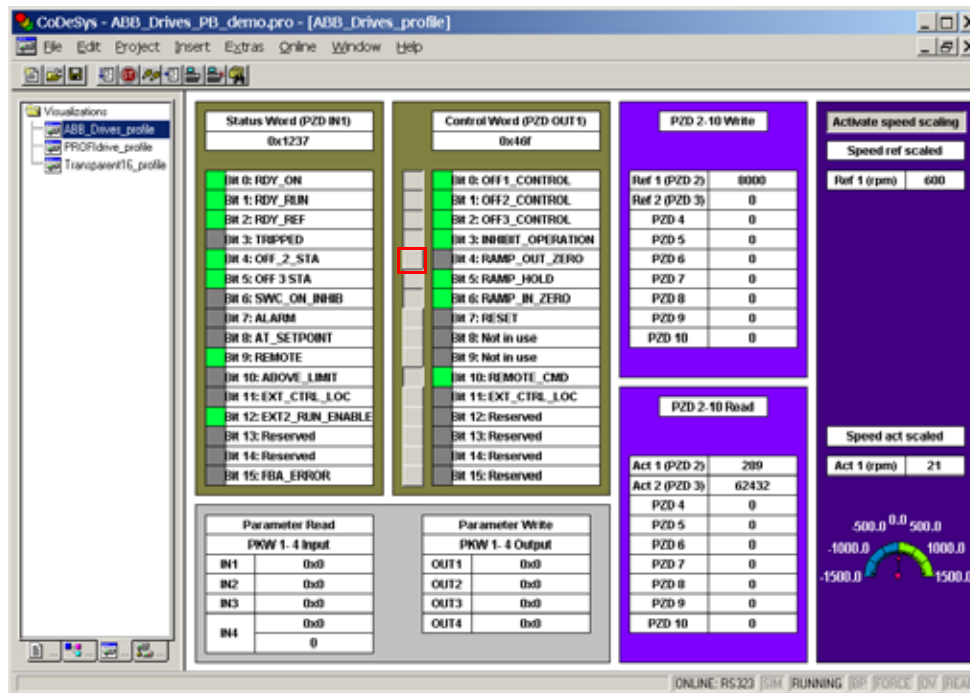


Tool/Step Running and testing the program

4. **Bit 3:** Inhibit operation, coast to stop. Proceed to OPERATION INHIBITED. CW: 0x477, SW: 0x233.

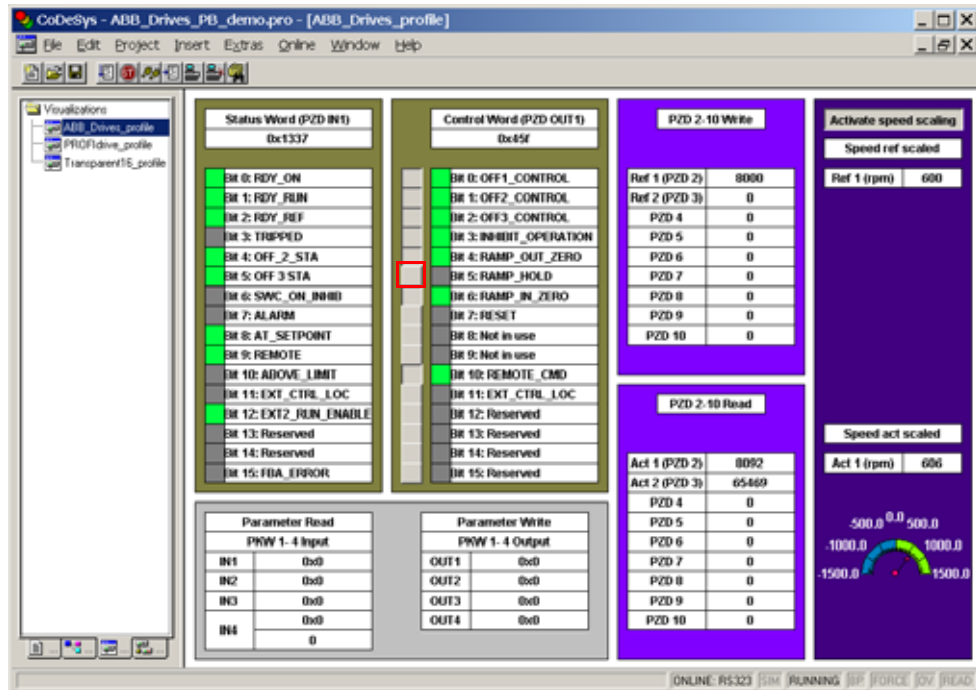


5. **Bit 4:** Force ramp function generator output to zero. Current and DC- voltage limits in force. CW: 0x46f, SW: 0x1237.

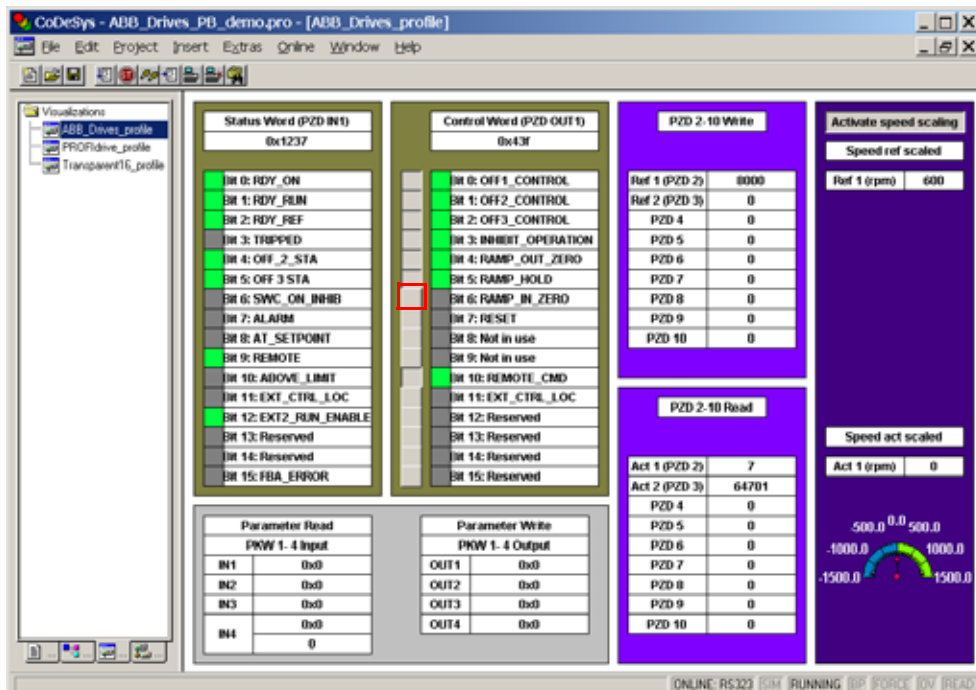


Tool/Step Running and testing the program

6. **Bit 5:** Halt ramping. Ramp generator input on hold. CW:45f, SW: 1337.



7. **Bit 6:** Force ramp function generator input to zero. Ramp function generator input is zero. CW:43f, SW: 1337.



Tool/Step

Running and testing the program

ABB Drives profile: Run at reference torque

1. Reset any active faults. Set Control word bits 7, 10 and 11 to TRUE(1). The green box next to the button indicates boolean TRUE (1). Control word: 0xc80. Status word: 0xb80.

CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]

File Edit Project Insert Extras Online Window Help

Visualizations

- ABB_Drives_profile
- PROFIdrive_profile
- Transparent16_profile

Status Word (PZD IN1)

0xb80

Bit 0: RDY_ON	
Bit 1: RDY_RUN	
Bit 2: RDY_REF	
Bit 3: TRIPPED	
Bit 4: OFF_2_STA	
Bit 5: OFF_3_STA	
Bit 6: SWC_ON_INHIB	
Bit 7: ALARM	
Bit 8: AT_SETPOINT	
Bit 9: REMOTE	
Bit 10: ABOVE_LIMIT	
Bit 11: EXT_CTRL_LOC	
Bit 12: EXT2_RUN_ENABLE	
Bit 13: Reserved	
Bit 14: Reserved	
Bit 15: FBA_ERROR	

Control Word (PZD OUT1)

0xc80

Bit 0: OFF1_CONTROL	
Bit 1: OFF2_CONTROL	
Bit 2: OFF3_CONTROL	
Bit 3: INHIBIT_OPERATION	
Bit 4: RAMP_OUT_ZERO	
Bit 5: RAMP_HOLD	
Bit 6: RAMP_IN_ZERO	
Bit 7: RESET	
Bit 8: Not in use	
Bit 9: Not in use	
Bit 10: REMOTE_CMD	
Bit 11: EXT_CTRL_LOC	
Bit 12: Reserved	
Bit 13: Reserved	
Bit 14: Reserved	
Bit 15: Reserved	

PZD 2-10 Write

Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

PZD 2-10 Read

Act 1 (PZD 2)	0
Act 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Parameter Read

PKW 1- 4 Input

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0

Parameter Write

PKW 1- 4 Output

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

Activate speed scaling

Speed ref scaled

Ref 1 (rpm) 0

Speed act scaled

Act 1 (rpm) 0

-500.0 0.0 500.0

-1000.0 1000.0

-1500.0 1500.0

ONLINE: RS323 SIM RUNNING BP FORCE OV READ

Tool/Step Running and testing the program

- Set the drive ready to operate. Set following Control word bits to TRUE(1): 11,10,3,2,1. Control word: 0xc0e. Status word: 0x1b31.

Status Word (PZD IN1)
0x1b31

Bit 0: RDY_ON	1
Bit 1: RDY_RUN	1
Bit 2: RDY_REF	1
Bit 3: TRIPPED	0
Bit 4: OFF_2_STA	0
Bit 5: OFF_3_STA	0
Bit 6: SWC_ON_INHIB	0
Bit 7: ALARM	0
Bit 8: AT_SETPOINT	0
Bit 9: REMOTE	0
Bit 10: ABOVE_LIMIT	0
Bit 11: EXT_CTRL_LOC	1
Bit 12: EXT2_RUN_ENABLE	1
Bit 13: Reserved	0
Bit 14: Reserved	0
Bit 15: FBA_ERROR	0

Control Word (PZD OUT1)
0xc0e

Bit 0: OFF1_CONTROL	0
Bit 1: OFF2_CONTROL	0
Bit 2: OFF3_CONTROL	0
Bit 3: INHIBIT_OPERATION	1
Bit 4: RAMP_OUT_ZERO	0
Bit 5: RAMP_HOLD	0
Bit 6: RAMP_IN_ZERO	0
Bit 7: RESET	0
Bit 8: Not in use	0
Bit 9: Not in use	0
Bit 10: REMOTE_CMD	1
Bit 11: EXT_CTRL_LOC	1
Bit 12: Reserved	0
Bit 13: Reserved	0
Bit 14: Reserved	0
Bit 15: Reserved	0

PZD 2-10 Write

Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

PZD 2-10 Read

Act 1 (PZD 2)	0
Act 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Parameter Read
PKW 1- 4 Input

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0

Parameter Write
PKW 1- 4 Output

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

Activate speed scaling
Speed ref scaled
Ref 1 (rpm) 0

Speed act scaled
Act 1 (rpm) 0

Speed act scaled display: -1500.0 to 1500.0 rpm scale.

ONLINE: RS323 | SIM | RUNNING | BP | FORCE | OV | READ

Tool/Step Running and testing the program

3. Start operating. Set following Control word bits to TRUE(1): 11,10,3,2,1,0. Control word: 0x0c0f. Status word: 0x1a37.

Visualizations

- ABB_Drives_profile
- PROFIdrive_profile
- Transparent16_profile

Status Word (PZD IN1)
0x1a37

Bit 0: RDY_ON	1
Bit 1: RDY_RUN	1
Bit 2: RDY_REF	1
Bit 3: TRIPPED	0
Bit 4: OFF_2_STA	0
Bit 5: OFF_3_STA	0
Bit 6: SWC_ON_INHIB	0
Bit 7: ALARM	0
Bit 8: AT_SETPOINT	0
Bit 9: REMOTE	0
Bit 10: ABOVE_LIMIT	0
Bit 11: EXT_CTRL_LOC	1
Bit 12: EXT2_RUN_ENABLE	1
Bit 13: Reserved	0
Bit 14: Reserved	0
Bit 15: FBA_ERROR	0

Control Word (PZD OUT1)
0xc0f

Bit 0: OFF1_CONTROL	1
Bit 1: OFF2_CONTROL	1
Bit 2: OFF3_CONTROL	1
Bit 3: INHIBIT_OPERATION	0
Bit 4: RAMP_OUT_ZERO	0
Bit 5: RAMP_HOLD	0
Bit 6: RAMP_IN_ZERO	0
Bit 7: RESET	0
Bit 8: Not in use	0
Bit 9: Not in use	0
Bit 10: REMOTE_CMD	1
Bit 11: EXT_CTRL_LOC	1
Bit 12: Reserved	0
Bit 13: Reserved	0
Bit 14: Reserved	0
Bit 15: Reserved	0

PZD 2-10 Write

Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

PZD 2-10 Read

Act 1 (PZD 2)	6
Act 2 (PZD 3)	52
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Parameter Read
PKW 1- 4 Input

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0

Parameter Write
PKW 1- 4 Output

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

Activate speed scaling

Speed ref scaled

Ref 1 (rpm)	0
-------------	---

Speed act scaled

Act 1 (rpm)	0
-------------	---

Speed visualization: -500.0 0.0 500.0, -1000.0 0.0 1000.0, -1500.0 0.0 1500.0

ONLINE: RS323 SIM RUNNING BP FORCE OV READ

Tool/Step Running and testing the program

- Run at reference torque. The scaling of torque is according to the ABB Drives profile. Reference 10000 corresponds to 100.00 % torque. Insert desired reference torque to **Ref 2 (PZD 3)** field and press enter. The drive ramps up to the reference torque.

If the speed limit (par 20.01) is met, the motor runs at TORQ REF SP LIM (par 3.12) to prevent motor rush.

You can monitor actual torque in the **Act 1 (PZD 3)** field.

You can monitor the actual cyclic data flow over fieldbus in **PZD 2-10** areas.

CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]

File Edit Project Insert Extras Online Window Help

Visualizations

- ABB_Drives_profile
- PROFdrive_profile
- Transparent16_profile

Status Word (PZD IN1)
0x1a37

Bit 0: RDY_ON	
Bit 1: RDY_RUN	
Bit 2: RDY_REF	
Bit 3: TRIPPED	
Bit 4: OFF_2_STA	
Bit 5: OFF_3_STA	
Bit 6: SWC_ON_INHIB	
Bit 7: ALARM	
Bit 8: AT_SETPOINT	
Bit 9: REMOTE	
Bit 10: ABOVE_LIMIT	
Bit 11: EXT_CTRL_LOC	
Bit 12: EXT2_RUN_ENABLE	
Bit 13: Reserved	
Bit 14: Reserved	
Bit 15: FBA_ERROR	

Control Word (PZD OUT1)
0xc0f

Bit 0: OFF1_CONTROL	
Bit 1: OFF2_CONTROL	
Bit 2: OFF3_CONTROL	
Bit 3: INHIBIT_OPERATION	
Bit 4: RAMP_OUT_ZERO	
Bit 5: RAMP_HOLD	
Bit 6: RAMP_IN_ZERO	
Bit 7: RESET	
Bit 8: Not in use	
Bit 9: Not in use	
Bit 10: REMOTE_CMD	
Bit 11: EXT_CTRL_LOC	
Bit 12: Reserved	
Bit 13: Reserved	
Bit 14: Reserved	
Bit 15: Reserved	

PZD 2-10 Write

Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	2000
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

PZD 2-10 Read

Act 1 (PZD 2)	18016
Act 2 (PZD 3)	1032
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Parameter Read
PKW 1- 4 Input

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0

Parameter Write
PKW 1- 4 Output

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

Activate speed scaling

Speed ref scaled

Ref 1 (rpm)	0
-------------	---

Speed act scaled

Act 1 (rpm)	1351
-------------	------

Speed gauge: -1500.0 to 1500.0 rpm

ONLINE: RS323 SIM RUNNING BP FORCE JOV READ

Running and testing the program

ABB Drives profile; Parameter handling (PKW 1-4 Read/Write) Reading a parameter

1. In cyclic PROFIBUS DP communication, parameter data is transferred in PPO message types PPO 1, 2 and 5. The Parameter Identification part consists of eight bytes. For information on parameter handling, *PROFIBUS DP Adapter Module FPBA-01 User's Manual* (3AFE68573271 [English]).

To read/write a parameter, a request is sent from the master (PLC) to the slave (drive). The following table describes request labels:

Request labels (from Master to Slave)		Response labels	
Request	Function	Ackn. (+)	Ackn. (-)
0	No task	0	-
1	Request parameter value	1, 2	7
2	Change parameter value (word)	1	7, 8
3	Change parameter value (double word)	2	7, 8
4	Request description element	3	7
5	Change description element	3	7, 8
6	Request parameter value (array)	4, 5	7, 8
7	Change parameter value (array word)	4	7, 8
8	Change parameter value (array double word)	5	7, 8
9	Request number of array elements	6	7

Tool/Step Running and testing the program

- Below, the drive parameter 19.01 SPEED SCALING is read.

The following request is sent to PKW Output (Parameter Write window):
 PKW 1: 0x6013 (Request parameter value (array), Index: 13h (19 Dec))
 PKW 2: 0x0100 (Subindex 01h)

Parameter Read window (PKW 1-4 Input) acknowledges:

PKW 1: 0x4013 (Transfer parameter value (array word), Index 13h (19 Dec))
 PKW 2: 0x0100 (Subindex 01h)
 PKW 3: 0x0000
 PKW 4: 0x05dc (Parameter value; 1500 (Dec))

Note: To write hexadecimal values in CoDeSys start input with 16#. For example: to write to a field OUT1, enter the input value 16#6013.

The screenshot displays the CoDeSys software interface for the ABB Drives profile. The main window is divided into several sections:

- Status Word (PZD IN1):** Shows a value of 0x1231. Bits 0-15 are listed with their corresponding status (e.g., Bit 0: RDY_ON, Bit 1: RDY_RUN, Bit 15: FBA_ERROR).
- Control Word (PZD OUT1):** Shows a value of 0x47e. Bits 0-15 are listed with their corresponding control actions (e.g., Bit 0: OFF1_CONTROL, Bit 1: OFF2_CONTROL, Bit 15: Reserved).
- Parameter Read (PKW 1-4 Input):** A table showing the input parameters for the read request:

IN	Value
IN1	0x4013
IN2	0x0100
IN3	0x0
IN4	0x5dc (1500)
- Parameter Write (PKW 1-4 Output):** A table showing the output parameters for the write request:

OUT	Value
OUT1	0x6013
OUT2	0x0100
OUT3	0x0
OUT4	0x0
- PZD 2-10 Write:** A table showing the write values for PZD 2-10:

PZD	Value
Ref 1 (PZD 2)	8000
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0
- PZD 2-10 Read:** A table showing the read values for PZD 2-10:

PZD	Value
Act 1 (PZD 2)	0
Act 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0
- Activate speed scaling:** A section with two sub-sections:
 - Speed ref scaled:** Ref 1 (rpm) is 600.
 - Speed act scaled:** Act 1 (rpm) is 0.
- Speed act scaled:** A speed feedback gauge showing a value of 0.0 rpm, with a scale from -1500.0 to 1500.0.

The bottom status bar indicates the system is ONLINE, RS323, SIM, RUNNING, BP, FORCE, JOV, and READ.

Tool/Step

Running and testing the program

ABB Drives profile; Parameter handling (PKW 1-4 Read/Write) Writing a parameter

- Below, parameter 20.01 MAXIMUM SPEED value 1330 is written.
Following request is sent to PKW Output:
PKW 1: 0x7014 (Change parameter value (array word), Index: 14h (20 Dec))
PKW 2: 0x0100 (Subindex 01h)

Parameter Read window (PKW 1-4 Input) acknowledges:

PKW 1: 0x4014 (Transfer parameter value (array word), Index 14h (20 Dec))
PKW 2: 0x0100 (Subindex 01h)
PKW 3: 0x0000
PKW 4: 0x0532 (Parameter value; 1330 (Dec))

Note: To write hexadecimal values in CoDeSys start input with 16#. For example: to write to a field OUT1, enter the input value 16#4014.

CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]

File Edit Project Insert Extras Online Window Help

Visualizations

- ABB_Drives_profile
- PROFIdrive_profile
- Transparent16_profile

Status Word (PZD IN1)
0x1231

Control Word (PZD OUT1)
0x17e

PZD 2-10 Write

Ref 1 (PZD 2)	8000
Ref 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Activate speed scaling

Speed ref scaled

Ref 1 (rpm) 600

PZD 2-10 Read

Act 1 (PZD 2)	0
Act 2 (PZD 3)	0
PZD 4	0
PZD 5	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Speed act scaled

Act 1 (rpm) 0

Parameter Read

PKW 1-4 Input	
IN1	0x4014
IN2	0x100
IN3	0x0
IN4	0x532
	1330

Parameter Write

PKW 1-4 Output	
OUT1	0x7014
OUT2	0x100
OUT3	0x0
OUT4	0x532

ONLINE RS323 SIM RUNNING BP FORCE OV READ

Tool/Step

Running and testing the program

Parameter handling; mapping parameters to the cyclic process data (PZD) communication channel

- Parameters can be mapped from the drive side by using groups 52 and 53. Open DriveStudio. Use parameter groups 52 and 53 to map parameters. To read a parameter, map it to the group 52 and to write a parameter map it to the group 53 respectively.

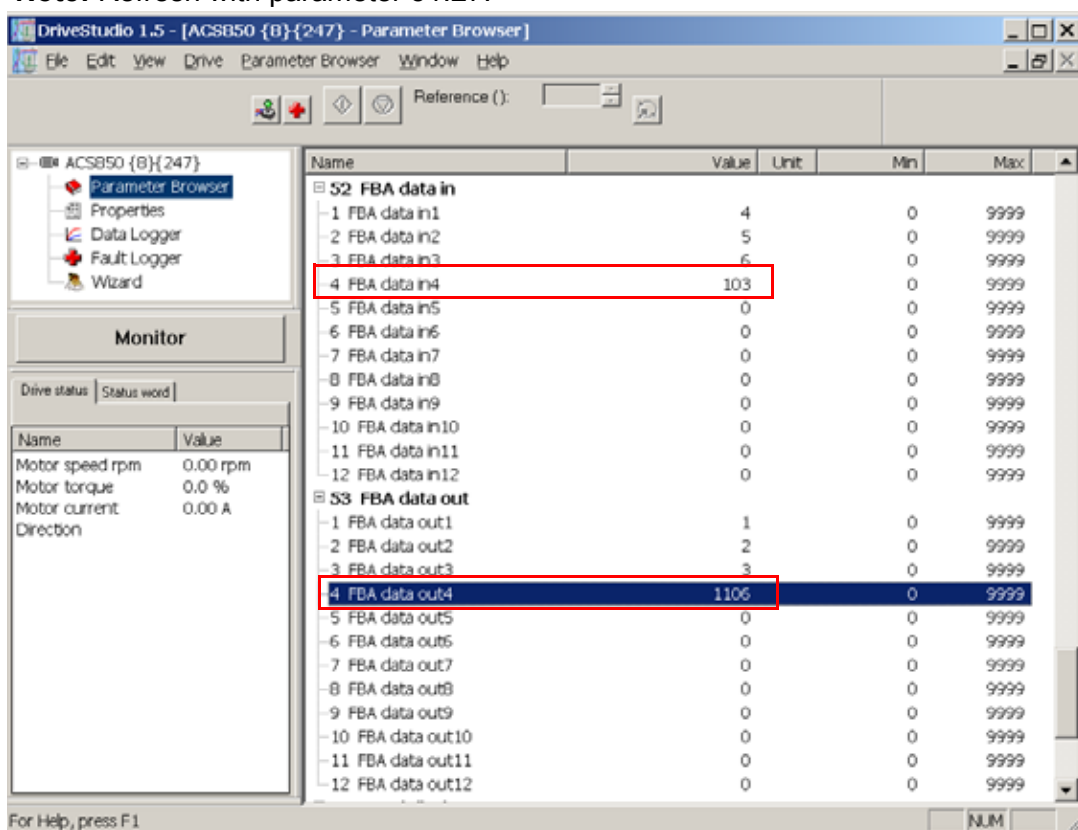
For example: to read output frequency, parameter value 52.04 is set to value 0103 (corresponding to parameter 01.03 Output frequency).

Note: When reading/writing 32-bit parameter two words are reserved, as in this case parameters 52.04 and 52.05.

Parameter lengths are found from the ACS850 hardware manual.

To write parameter 11.06 DC HOLD, parameter value 53.04 is set to 1106.

Note: Refresh with parameter 51.27.



Tool/Step Running and testing the program

2. In the image below:
 The value of parameter 1.03 OUTPUT FREQUENCY is read from the drive parameters 52.04 and 52.05. This mapping example employs process data channel Read PZD 4 and 5. Frequency is 1363 which corresponds to 13.63 Hz.
 Parameter 11.06 DC HOLD is written to the mapped drive parameter 53.04. This mapping example employs process data channel Write PZD 4. In this case parameter 11.06 value is changed to 1 (Enabled).

The screenshot displays the CoDeSys software interface for an ABB drive. The main window is titled "CoDeSys - ABB_Drives_PB_demo.pro* - [ABB_Drives_profile]". The interface is divided into several sections:

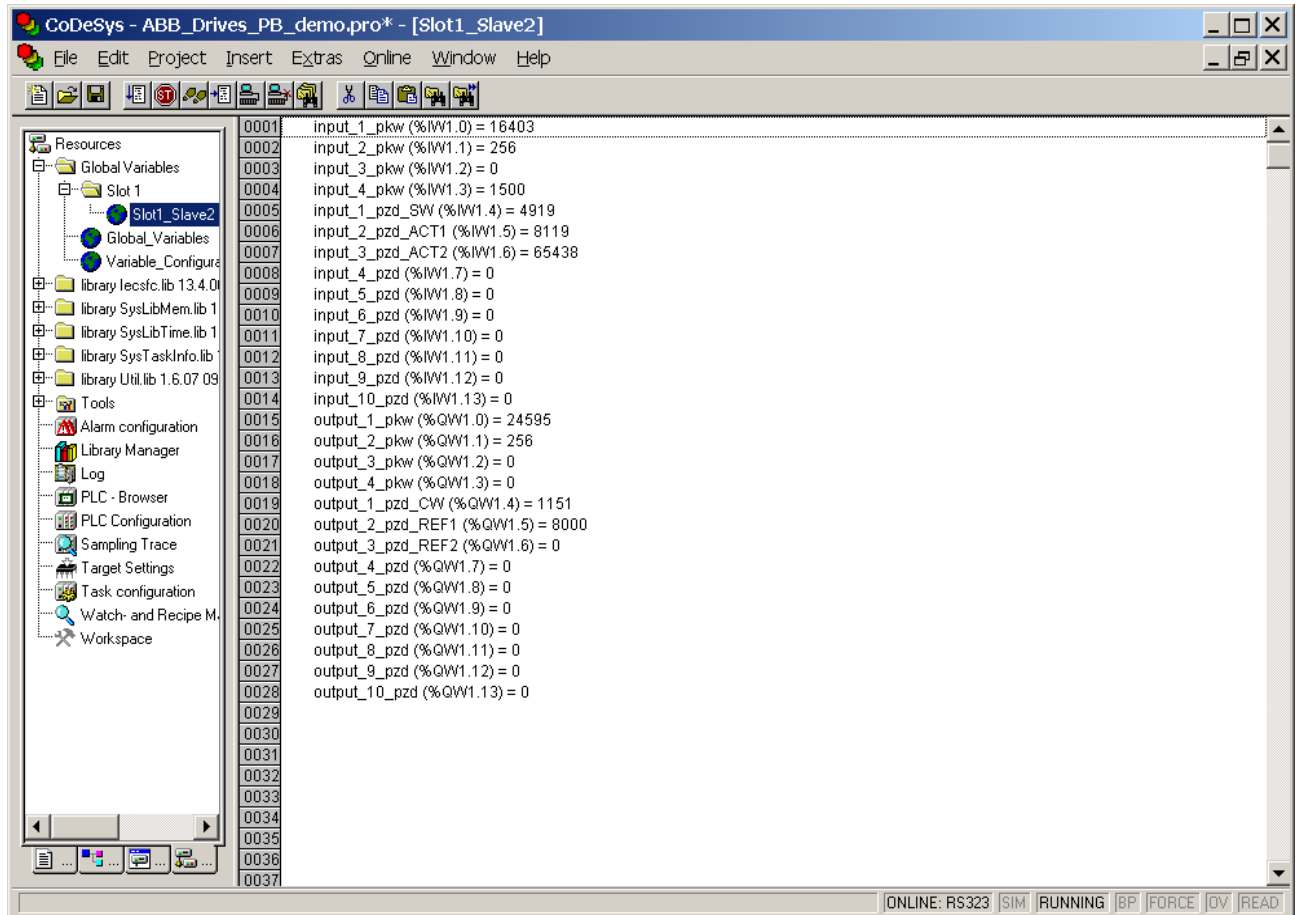
- Visualizations:** A tree view on the left shows the project structure with "ABB_Drives_profile", "PROFIdrive_profile", and "Transparent16_profile".
- Status Word (PZD IN1):** A table showing the status of various bits. Bit 0 (RDY_ON) is green, Bit 1 (RDY_RUN) is green, Bit 2 (RDY_REF) is green, Bit 3 (TRIPPED) is grey, Bit 4 (OFF_2_STA) is green, Bit 5 (OFF_3_STA) is green, Bit 6 (SWC_ON_INHIB) is grey, Bit 7 (ALARM) is grey, Bit 8 (AT_SETPOINT) is green, Bit 9 (REMOTE) is grey, Bit 10 (ABOVE_LIMIT) is grey, Bit 11 (EXT_CTRL_LOC) is grey, Bit 12 (EXT2_RUN_ENABLE) is green, Bit 13 (Reserved) is grey, Bit 14 (Reserved) is grey, and Bit 15 (FBA_ERROR) is grey.
- Control Word (PZD OUT1):** A table showing the control of various bits. Bit 0 (OFF1_CONTROL) is green, Bit 1 (OFF2_CONTROL) is green, Bit 2 (OFF3_CONTROL) is green, Bit 3 (INHIBIT_OPERATION) is green, Bit 4 (RAMP_OUT_ZERO) is green, Bit 5 (RAMP_HOLD) is green, Bit 6 (RAMP_IN_ZERO) is green, Bit 7 (RESET) is grey, Bit 8 (Not in use) is grey, Bit 9 (Not in use) is grey, Bit 10 (REMOTE_CMD) is green, Bit 11 (EXT_CTRL_LOC) is grey, Bit 12 (Reserved) is grey, Bit 13 (Reserved) is grey, Bit 14 (Reserved) is grey, and Bit 15 (Reserved) is grey.
- PZD 2-10 Write:** A table showing the write values for PZD 2 to 10. PZD 2 is 5333, PZD 3 is 0, PZD 4 is 1 (circled in red), PZD 5 is 0, PZD 6 is 0, PZD 7 is 0, PZD 8 is 0, PZD 9 is 0, and PZD 10 is 0.
- PZD 2-10 Read:** A table showing the read values for PZD 2 to 10. PZD 2 is 5350, PZD 3 is 252, PZD 4 is 0, PZD 5 is 1363 (circled in red), PZD 6 is 0, PZD 7 is 0, PZD 8 is 0, PZD 9 is 0, and PZD 10 is 0.
- Parameter Read:** A table showing the read values for PKW 1-4 Input. IN1 is 0x0, IN2 is 0x0, IN3 is 0x0, and IN4 is 0.
- Parameter Write:** A table showing the write values for PKW 1-4 Output. OUT1 is 0x0, OUT2 is 0x0, OUT3 is 0x0, and OUT4 is 0x0.
- Activate speed scaling:** A section showing speed scaling parameters. "Speed ref scaled" has a value of 400 rpm. "Speed act scaled" has a value of 401 rpm. A speed gauge is also displayed with a scale from -1500.0 to 1500.0.

The status bar at the bottom indicates the system is "ONLINE: RS323" and the drive is in "RUNNING" mode.

Tool/Step Running and testing the program

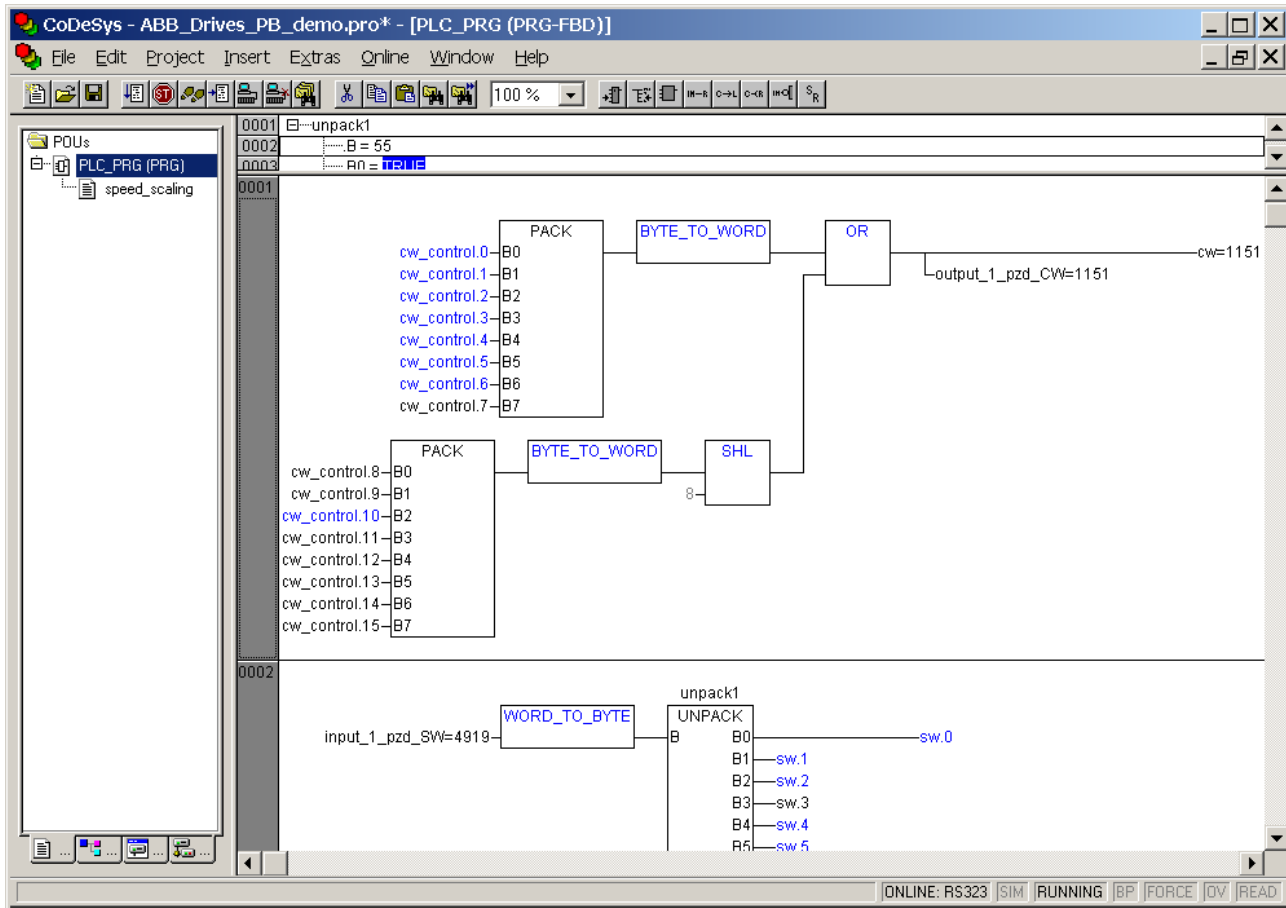
How to perform online monitoring

1. While running the program, you can use CoDeSys for online monitoring. The image below presents inputs and outputs of the drive.



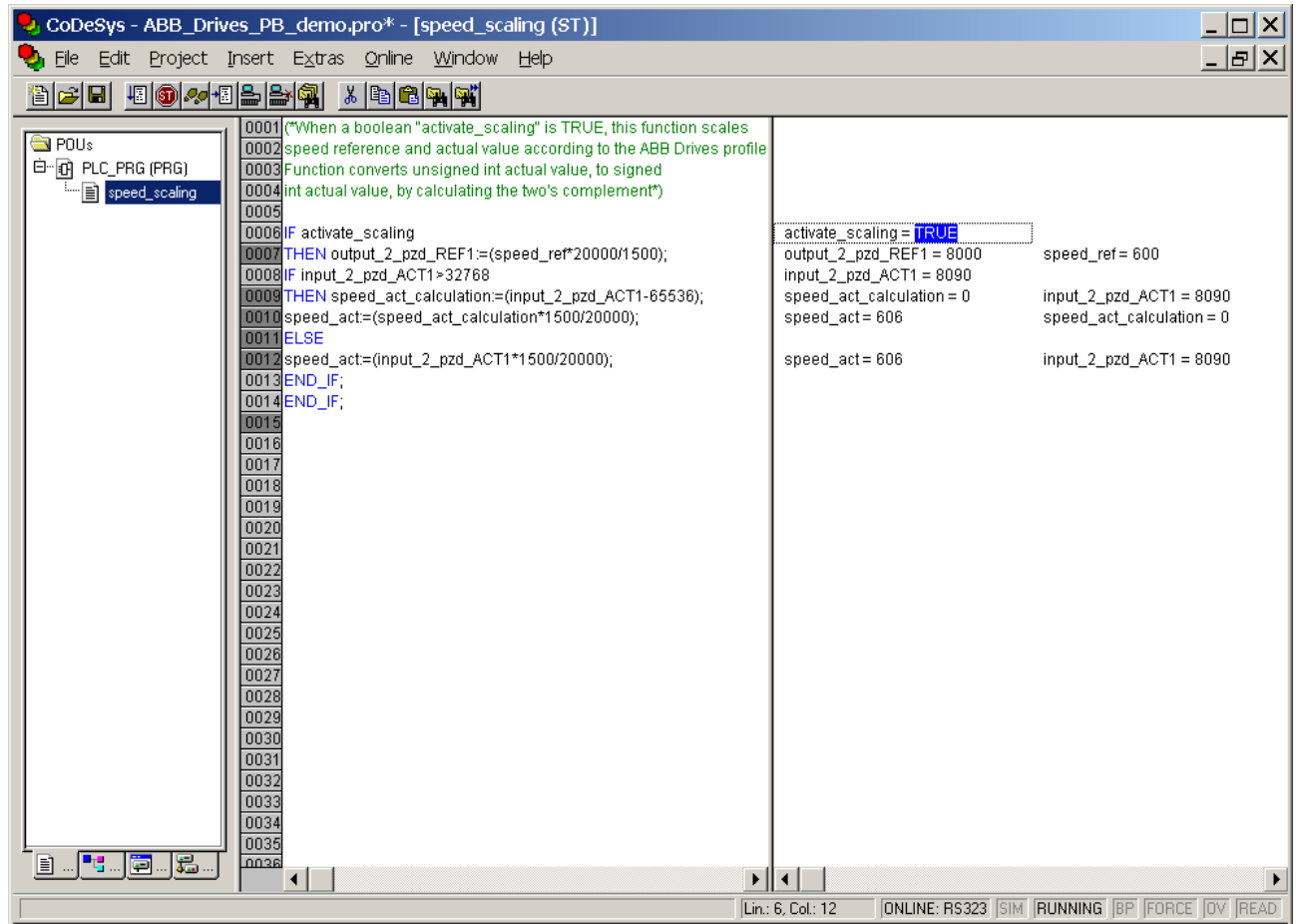
Tool/Step Running and testing the program

- The image below presents the main program. While running, the blue color indicates boolean value TRUE. To force a variable value change, double-click the variable and enter new value. Press **F7** to execute the forced change.



Tool/Step Running and testing the program

- Monitoring speed_scaling action. To force a variable value change, double-click the variable and enter new value. Press **F7** to execute the forced change.



ACS850 Crane Control Program supplement

What this chapter contains

This chapter presents parameter configuration and utilization demonstrations for ACS850 (+N697) Crane control program over Profibus DP fieldbus. For the crane control you can use a ready-made CodeSys project `ABB_Drives_ACS850_crane_control.pro`. The project and the parameter file is in the ABB library, "vault ID" part 2.

The project `ABB_Drives_ACS850_crane_control.pro` employs the Main Control Word to control the ACS850-04 Crane control software. Crane Control Words 1 and 2 are not used to control the crane in this example. To utilize Crane Control Words 1 and 2 you must separately parametrize bit pointers, which points to the action of Crane Control Word bit x. For more details, see *ACS850 Standard Control Program Firmware Manual* (3AUA0000045497 [English]) and *ACS850 Crane Control Program Supplement* (3AUA0000081708 [English]).

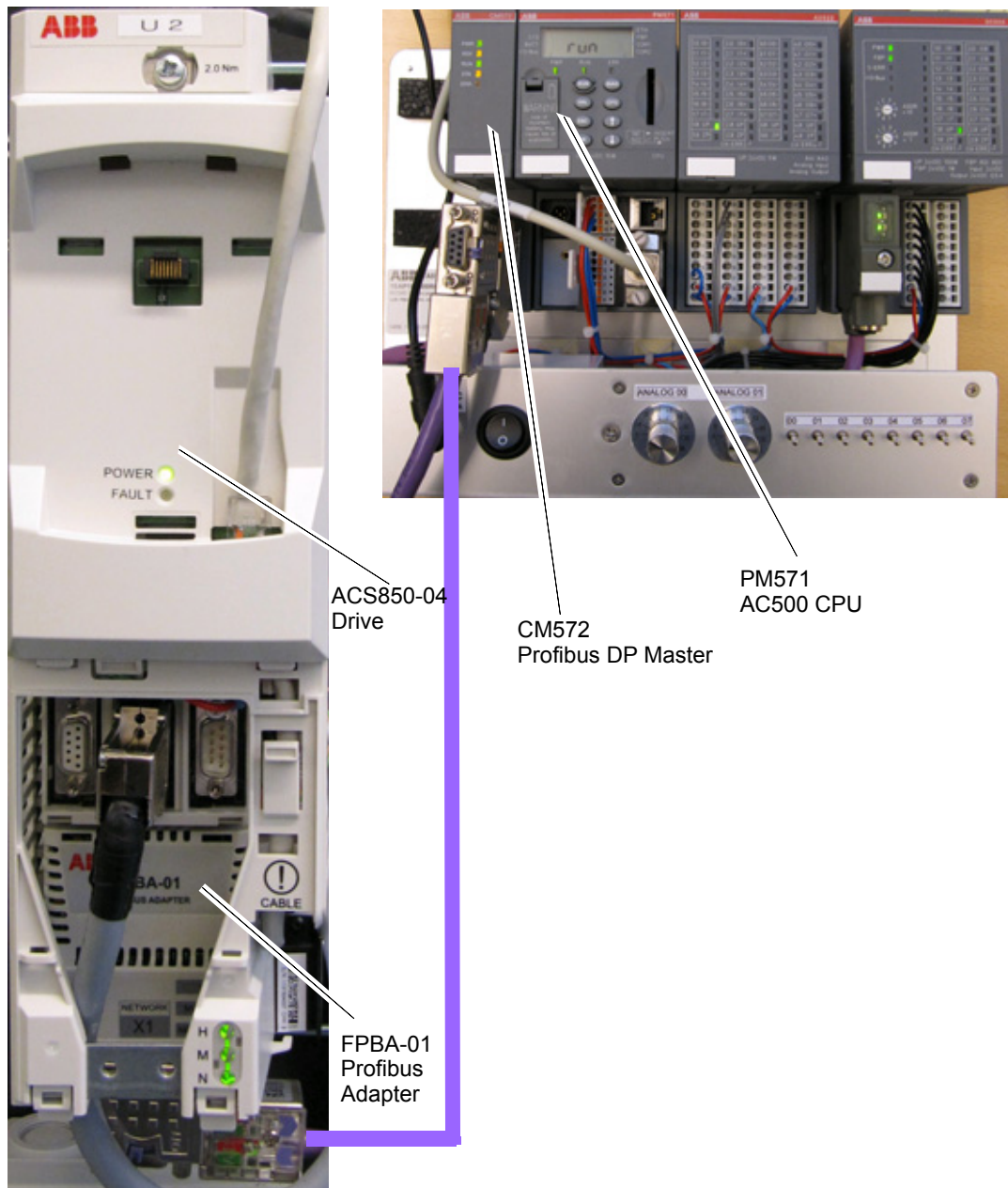
Parametrization is according to the ABB Drives profile. The demonstrations contain examples for speed and torque control, stopping and starting cycles and fault simulation. For information on reading and writing to parameters, see chapter [ABB Drives profile; Parameter handling \(PKW 1-4 Read/Write\) Reading a parameter](#), page 124.

Tool/Step

Crane control program supplement**Electrical installation**

Electrical installation is similar to page 61. Follow the installation instructions in the chapter [Start-up flowchart](#) on page 59.

In the following image a FPBA-01 Profibus communication module is installed to ACS850-04 drive option slot 3. A Profibus cable is connected to the FPBA-01 module and the module is connected with the cable to the CM572 Profibus DP master.



Tool/Step

Crane control program supplement**Parametrization**

1. Set the ACS850 Crane Control Program parameter settings given in this section for successful communication with the FPBA-01 fieldbus adapter module. The following setup is intended for the ABB Drives profile. Set all other necessary parameters to meet your application needs.

For more information on the parameters refer to the manual: *ACS850 Crane Control Program supplement* (3AUA0000081708 [English]).

For advice on using the DriveStudio, refer to the DriveStudio online Help.

Tool/Step Crane control program supplement

2. Open the DriveStudio. Set the parameters listed below. This setup is according to the ABB Drives profile.

10 Start/stop/dir				
1 Ext1 start func	FBA	0	6	
2 Ext1 start in1	DI1			
3 Ext1 start in2	C.False			
4 Ext2 start func	FBA	0	6	
12 Operating mode				
1 Ext1/Ext2 sel	C.False			
3 Ext1 ctrl mode	Speed	1	5	
5 Ext2 ctrl mode	Torque	1	5	
7 Local ctrl mode	Speed	1	2	
19 Speed calculation				
1 Speed scaling	1500 rpm	0	30000	
21 Speed ref				
1 Speed ref1 sel	FBA ref1			
2 Speed ref2 sel	Zero			
3 Speed ref1 func	Ref1	0	5	
4 Speed ref1/2 sel	C.False			
5 Speed share	1.000	-8.000	8.000	
24 Torque ref				
1 Torq ref1 sel	FBA ref2			
2 Torq ref add sel	Zero			
3 Maximum torq ref	300.0 %	0.0	1000.0	
4 Minimum torq ref	-300.0 %	-1000.0	0.0	
5 Load share	1.000	-8.000	8.000	
50 Fieldbus				
1 Fba enable	Enable	0	1	
2 Comm loss func	Fault	0	3	
3 Comm loss t out	0.3 s	0.3	6553.5	
4 Fba ref1 modesel	Speed	0	2	
5 Fba ref2 modesel	Torque	0	2	
51 FBA settings				
1 FBA type	Profibus-DP	0	65535	
2 FBA par2	3	0	65535	
3 FBA par3	12000	0	65535	
4 FBA par4	5	0	65535	
5 FBA par5	1	0	65535	
52 FBA data in				
1 FBA data in1	4	0	9999	
2 FBA data in2	5	0	9999	
3 FBA data in3	6	0	9999	
4 FBA data in4	501	0	9999	
5 FBA data in5	0	0	9999	
6 FBA data in6	502	0	9999	
7 FBA data in7	0	0	9999	
8 FBA data in8	503	0	9999	

53 FBA data out			
1 FBA data out1	1	0	9999
2 FBA data out2	2	0	9999
3 FBA data out3	3	0	9999
4 FBA data out4	1078	0	9999
5 FBA data out5	1079	0	9999
51 FBA settings			
1 FBA type	Profibus-DP	0	65535
2 FBA par2	3	0	65535
3 FBA par3	12000	0	65535
4 FBA par4	5	0	65535
5 FBA par5	1	0	65535
6 FBA par6	100	0	65535
7 FBA par7	0	0	65535
8 FBA par8	0	0	65535
9 FBA par9	0	0	65535
10 FBA par10	0	0	65535
11 FBA par11	0	0	65535
12 FBA par12	0	0	65535
13 FBA par13	0	0	65535
14 FBA par14	0	0	65535
15 FBA par15	0	0	65535
16 FBA par16	0	0	65535
17 FBA par17	0	0	65535
18 FBA par18	0	0	65535
19 FBA par19	0	0	65535
20 FBA par20	0	0	65535
21 FBA par21	0	0	65535
22 FBA par22	0	0	65535
23 FBA par23	0	0	65535
24 FBA par24	0	0	65535
25 FBA par25	0	0	65535
26 FBA par26	0	0	65535
27 FBA par refresh	DONE	0	1
28 Par table ver	DONE	0x0000	0xFFFF
29 Drive type code	REFRESH	0	65535
16 System			
1 Local lock	C.False		
2 Parameter lock	Open	0	2
3 Pass code	0	0	21474836...
4 Param restore	Done	0	2
7 Param save	Done	0	1
9 User set sel	Done	1	10
10 User set log	Save	0	42949672...

Tool/Step

Crane control program supplement**Crane control program fieldbus commands**

Following commands are send to a slave (drive) by a fieldbus master (PLC).

Start the drive

The start sequence for the speed control is given in the table below.

Reset faults, if any. Set the drive to Ready to operate, then to Start operating. Give speed reference. The motor accelerates until it is running at the reference speed.

Step	Control Word (Hex)	Operation	Status Word	Speed ref	Speed act
1	0x0000	Fault active	0x1338	0	0
2	0x0480	Reset fault	0x0380	0	0
3	0x047e	Ready to operate	0x1331	0	0
4	0x047f	Operating	0x1337	0	0
5	0x047f	Give speed reference	0x1337	500	0
6	0x047f	Motor runs at ref speed	0x1337	500	500

To change direction give negative reference; follow steps below.

Step	Control Word (Hex)	Operation	Status Word	Speed ref	Speed act
1	0x047f	Motor runs at ref speed	0x1337	500	500
2	0x047f	Motor runs at ref speed	0x1337	-500	-500

Stop the drive

- Several stop modes are available. Stop modes are briefly described below. For detailed description on the Control Word utilization look chapter [ABB Drives profile; Stopping](#) on page 116. To stop the drive use the Main Control word as described in the following examples.
- OFF1: Stop along currently active deceleration ramp, ACS850 parameter 22.03 or 22.05. Proceed to OFF1 ACTIVE; proceed to READY SWITCH-ON. Brake ON.

Function: Drive ramps to a 0-speed and activates brake, field excitation is disabled.

To start again execute step 3.

Step	Control Word (Hex)	Operation	Status Word	Speed ref	Speed act
1	0x047f	Motor runs at ref speed	0x1337	500	500
2	0x047e	Stop along currently active dec. ramp. Brake on.	0x1231	500	0
3	0x047f	Start again.	0x1337	500	500

Tool/Step Crane control program supplement

3. OFF3: Emergency stop. Stop along currently active emergency stop ramp, defined by ACS850 parameter 22.12. Proceed to OFF3 ACTIVE; proceed to SWITCH-ON INHIBITED. Brake ON.

Function: Drive ramps to a 0-speed according to the emergency stop ramp and activates brake, field excitation is disabled.

To start again execute steps 3 and 4.

Step	Control Word (Hex)	Operation	Status Word	Speed ref	Speed act
1	0x047f	Motor runs at ref speed	0x1337	500	500
2	0x047b	Emergency stop along emergency dec. ramp. Brake on.	0x12d0	500	0
3	0x047e	Ready to operate	0x1231	500	0
4	0x047f	Start again.	0x1337	500	500

4. Force ramp function generator to zero.

Function: Drive ramps to a 0-speed according to the currently active deceleration ramp. Field excitation stays enabled.

To start again execute step 3.

Step	Control Word (Hex)	Operation	Status Word	Speed ref	Speed act
1	0x047f	Motor runs at ref speed	0x1337	500	500
2	0x043f	Force ramp function generator input to zero	0x1237	500	0
3	0x047f	Start again	0x1337	500	500

Tool/Step

Crane control program supplement*Fault simulation; reset and start again*

1. Safe Torque Off is opened to simulate fault while running. The table below describes the steps to take to reset and start the drive again.

Function: When the Safe Torque Off is triggered: Drive trips, torque is disabled, brake is enabled and motor stops.

To start again: check that STO circuit is closed. Execute step 3 to reset the fault. Execute steps 4 and 5 in order to run the drive again.

Step	Control Word (Hex)	Operation	Status Word	Speed ref	Speed act
1	0x047f	Motor runs at ref speed	0x1337	500	500
2	0x047f	Safe torque off is triggered-> Drive trips. Brake on. Motor stops.	0x1238	500	0
3	0x0480	Reset fault	0x0238	500	0
4	0x047e	Ready to operate	0x1231	500	0
5	0x047f	Start again	0x1337	500	500

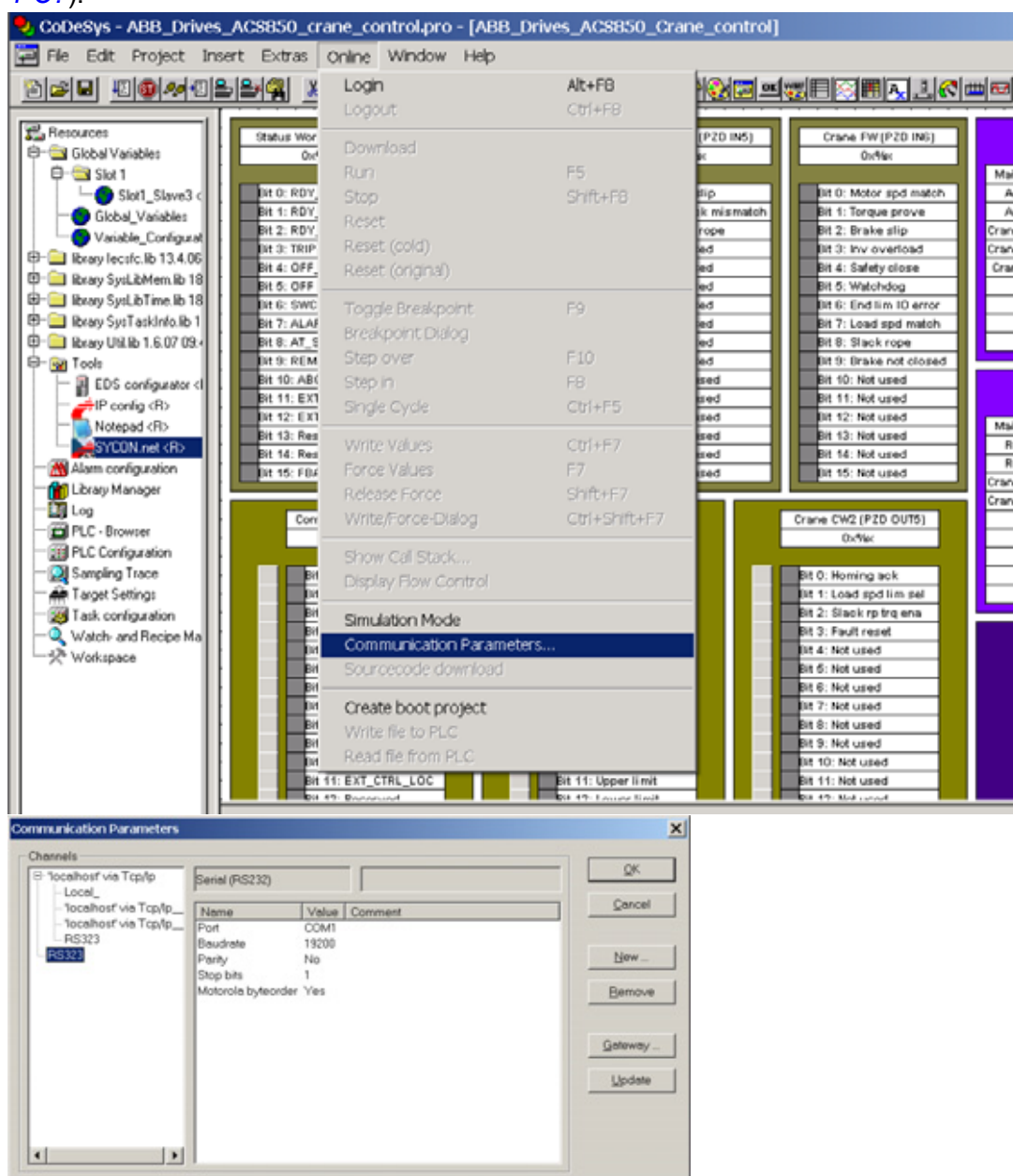
Tool/Step

Crane control program supplement

Utilization with CodeSys and AC500 PLC

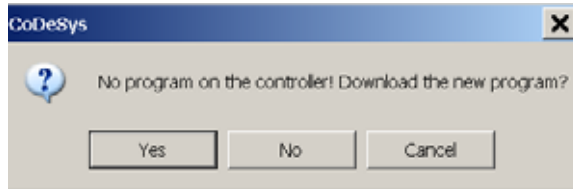
How to download the program to the controller and run the program

1. Check that the AC500 PLC and ACS850 drive are switched on and the connections are made properly, refer to the page 61.
2. From the **Online** menu, select **Communication Parameters....** Check that the communication parameters correspond to the serial/ethernet port of your PC (see [Appendix A - How to find out the serial communication parameter values of your PC?](#)).

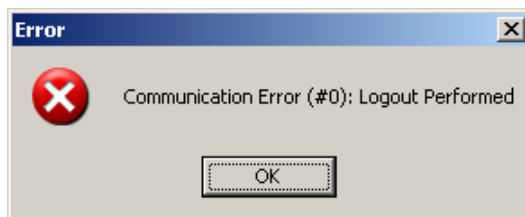


Tool/Step Crane control program supplement

3. From the **Online** menu, click **Login**. The program asks you to download the program to the controller. Click **Yes**.



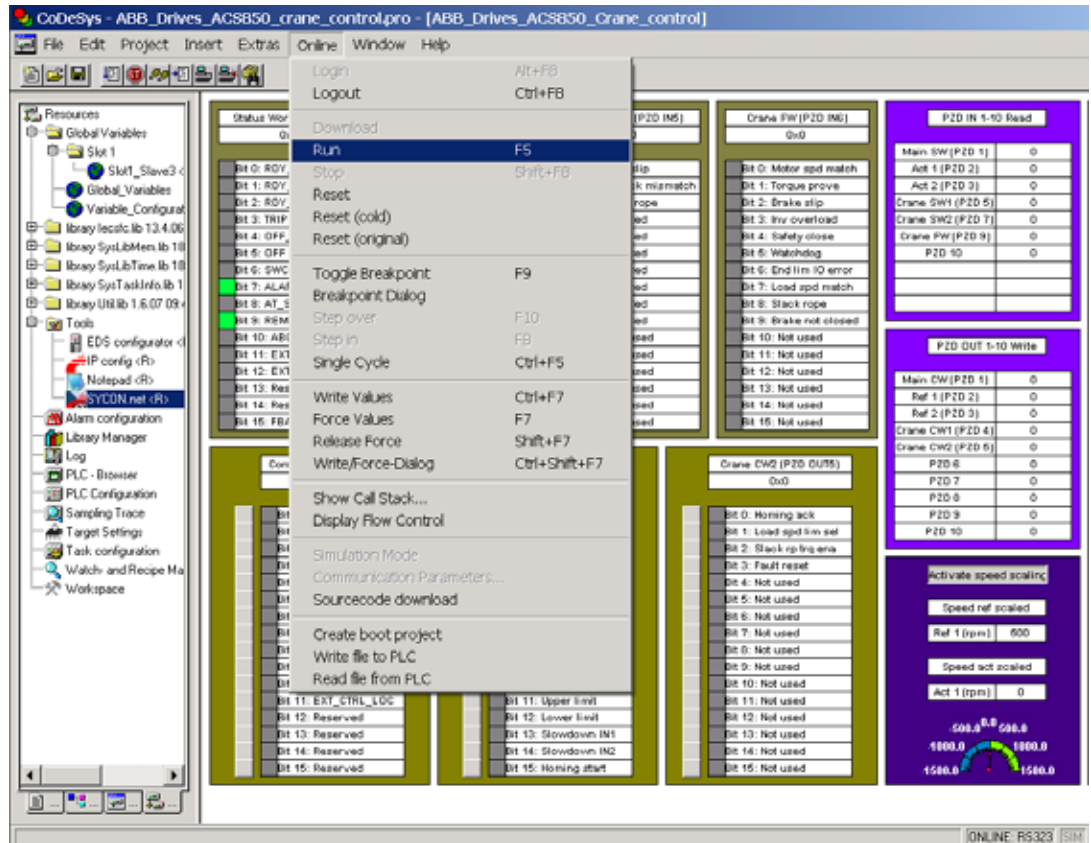
If you get a communication error message, then the connection between the PC and the PLC is not properly established.



Check the cables and connections. From the **Online** menu, select **Communication Parameters...** and remove irrelevant communication parameters. Configure the communication with the SYCON.net again and download the configuration. To find out the communication parameter values of your PC, see [Appendix A - How to find out the serial communication parameter values of your PC?](#)

Tool/Step Crane control program supplement

- From the **Online** menu, select **Run**. The program starts running and you can test its features.



Tool/Step

Crane control program supplement

ABB Drives profile; Run at reference speed

1. First reset any active faults, set Control word bits 7 and 10 to TRUE(1). To set a bit value to TRUE toggle gray button next to the bit indicator. The green box next to the button indicates boolean TRUE (1). Control word: 0x480. Status word: 0x380.

The screenshot shows the CoDeSys software interface for the ABB Drives profile. The main window displays several parameter tables:

- Status Word (PZD IN1):** 0x380. Bits 0-15 are listed, with bits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 all set to 1 (indicated by green boxes).
- Control Word (PZD OUT1):** 0x480. Bits 0-15 are listed, with bits 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, and 15 all set to 1 (indicated by green boxes).
- PZD IN 1-10 Read:** A table showing input parameters for PZD 1-10, with values ranging from 0 to 15542.
- PZD OUT 1-10 Write:** A table showing output parameters for PZD 1-10, with values ranging from 0 to 1152.
- Speed scaling:** A section titled "Activate speed scaling" with a "Speed ref scaled" button and a "Speed act scaled" button. Below these buttons is a speed scale from 0 to 1500.0, with a current speed of 500.0.

The interface also includes a menu bar (File, Edit, Project, Insert, Extras, Online, Window, Help) and a toolbar with various icons for file operations and simulation.

Tool/Step Crane control program supplement

- Set the drive ready to run. Set the following Control word bits to TRUE(1): 10,6,5,4,3,2,1. Control word: 0x47e. Status word: 0x1331.

The screenshot shows the CoDeSys software interface for the ABB Drives ACS850 crane control program. The main window displays several parameter tables and a speed scaling graph.

Control Word (PZD OUT1) 0x47e:

Bit 0: OFF1_CONTROL	Bit 1: OFF2_CONTROL	Bit 2: OFF3_CONTROL	Bit 3: INHIBIT_OPERATION	Bit 4: RAMP_OUT_ZERO	Bit 5: RAMP_HOLD	Bit 6: RAMP_IN_ZERO	Bit 7: RESET	Bit 8: Not in use	Bit 9: Not in use	Bit 10: REMOTE_CMD	Bit 11: EXT_CTRL_LOC	Bit 12: Reserved	Bit 13: Reserved	Bit 14: Reserved	Bit 15: Reserved
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Status Word (PZD IN1) 0x1331:

Bit 0: RDY_ON	Bit 1: RDY_RUN	Bit 2: RDY_REF	Bit 3: TRIPPED	Bit 4: OFF_2_STA	Bit 5: OFF_3_STA	Bit 6: SWC_ON_INHIB	Bit 7: ALARM	Bit 8: AT_SETPOINT	Bit 9: REMOTE	Bit 10: ABOVE_LIMIT	Bit 11: EXT_CTRL_LOC	Bit 12: Reserved	Bit 13: Reserved	Bit 14: Reserved	Bit 15: FBA_ERROR
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Crane SW1 (PZD IN4) 0x409e:

Bit 0: Slowdown active	Bit 1: Slowdown up act	Bit 2: Slowdown dn act	Bit 3: Upper lim	Bit 4: Lower lim	Bit 5: Load speed lim	Bit 6: Em edl active	Bit 7: Pwr on ack signl	Bit 8: Load spd up lim	Bit 9: Load spd dn lim	Bit 10: Torque prove ok	Bit 11: Brake slip warn	Bit 12: Joystick check	Bit 13: Joystick zero pos	Bit 14: Watchdog rly ok	Bit 15: Slack rope
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Crane SW2 (PZD IN5) 0x0:

Bit 0: Load slip	Bit 1: Brk ack mismatch	Bit 2: Slack rope	Bit 3: Not used	Bit 4: Not used	Bit 5: Not used	Bit 6: Not used	Bit 7: Not used	Bit 8: Not used	Bit 9: Not used	Bit 10: Not used	Bit 11: Not used	Bit 12: Not used	Bit 13: Not used	Bit 14: Not used	Bit 15: Not used
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Crane FW (PZD IN6) 0x0:

Bit 0: Motor spd match	Bit 1: Torque prove	Bit 2: Brake slip	Bit 3: Inv overload	Bit 4: Safety close	Bit 5: Watchdog	Bit 6: End lim IO error	Bit 7: Load spd match	Bit 8: Slack rope	Bit 9: Brake not closed	Bit 10: Not used	Bit 11: Not used	Bit 12: Not used	Bit 13: Not used	Bit 14: Not used	Bit 15: Not used
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Crane CW1 (PZD OUT4) 0x0:

Bit 0: Start fwd	Bit 1: Start rev	Bit 2: Acc/Dec sel	Bit 3: Step ref mode	Bit 4: Slow ref mode	Bit 5: Step ref sel 1	Bit 6: Step ref sel 2	Bit 7: Step ref sel 3	Bit 8: Step ref sel 4	Bit 9: Curr supervision	Bit 10: Mismatch ref	Bit 11: Upper limit	Bit 12: Lower limit	Bit 13: Slowdown IN1	Bit 14: Slowdown IN2	Bit 15: Homing start
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Crane CW2 (PZD OUT5) 0x0:

Bit 0: Homing ack	Bit 1: Load spd lim sel	Bit 2: Slack rope ens	Bit 3: Fault reset	Bit 4: Not used	Bit 5: Not used	Bit 6: Not used	Bit 7: Not used	Bit 8: Not used	Bit 9: Not used	Bit 10: Not used	Bit 11: Not used	Bit 12: Not used	Bit 13: Not used	Bit 14: Not used	Bit 15: Not used
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Parameter Write:

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

Parameter Read:

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0x0

Speed Scaling Graph:

The graph shows speed scaling with a range from 0 to 1500.0. The current speed is 0.0. The graph is labeled "Activate speed scaling".

Bottom Status Bar:

ONLINE: RS323 SIM RUNNING SP FORCE DV READ

Tool/Step

Crane control program supplement

3. Start modulating: set the following Control word bits to TRUE(1): 10,6,5,4,3,2,1,0.
Control word: 0x47f. Status word: 0x1337.

The screenshot displays the CoDeSys software interface for the ABB_Drives_ACS850_crane_control.pro project. The interface is divided into several panels:

- Left Panel:** Shows the project structure with 'PDI' and 'VLC_PAG (PAG)' folders, and a 'speed_scaling' sub-folder.
- Top Panels:**
 - Status Word (PZD IN1):** 0x1337. Bits 0-15 are listed with their corresponding status (e.g., Bit 0: RDY_ON, Bit 1: RDY_RUN).
 - Crane SW1 (PZD IN4):** 0x44fe. Bits 0-15 are listed with their corresponding status (e.g., Bit 0: Slowdown active, Bit 1: Slowdown up act).
 - Crane SW2 (PZD IN5):** 0x0. Bits 0-15 are listed with their corresponding status (e.g., Bit 0: Load slip, Bit 1: Brake mismatch).
 - Crane FW (PZD IN6):** 0x0. Bits 0-15 are listed with their corresponding status (e.g., Bit 0: Motor spd match, Bit 1: Torque prove).
- Right Panels:**
 - PZD IN 1-10 Read:** Shows values for Main SW (PZD 1), Act 1 (PZD 2), Act 2 (PZD 3), Crane SW1 (PZD 6), Crane SW2 (PZD 7), Crane FW (PZD 9), and PZD 10.
 - Parameter Write:** Shows values for OUT1, OUT2, OUT3, OUT4, and IN4.
 - PZD OUT 5-10 Write:** Shows values for Main CW (PZD 1), Ref 1 (PZD 2), Ref 2 (PZD 3), Crane CW1 (PZD 4), Crane CW2 (PZD 6), PZD 6, PZD 7, PZD 8, PZD 9, and PZD 10.
 - Activate speed scaling:** A section with a 'Speed ref scaled' gauge and a 'Speed act scaled' gauge. The 'Ref 1 (rpm)' is set to 0, and the 'Act 1 (rpm)' is set to 0. The gauge shows a range from 1500.0 to 1500.0.
- Bottom Panels:**
 - Control Word (PZD OUT1):** 0x47f. Bits 0-15 are listed with their corresponding status (e.g., Bit 0: OFF1_CONTROL, Bit 1: OFF2_CONTROL).
 - Crane CW1 (PZD OUT4):** 0x0. Bits 0-15 are listed with their corresponding status (e.g., Bit 0: Start fwd, Bit 1: Start rev).
 - Crane CW2 (PZD OUT5):** 0x0. Bits 0-15 are listed with their corresponding status (e.g., Bit 0: Hoisting lock, Bit 1: Load spd lim sel).

Tool/Step Crane control program supplement

- This project contains a scaling function for the ABB Drives profile. The speed scaling function enables to enter a reference speed in rpm. To activate speed scaling, toggle button: **Activate speed scaling**. Insert desired reference speed to **Ref 1 (rpm)** field and press enter. The drive ramps up to the reference speed. You can monitor actual speed in the **Act 1 (rpm)** field and also from speedometer below the field. You can monitor the actual cyclic data flow over fieldbus in **PZD 1-10** areas.

The screenshot displays the CodeSys software interface for the ABB_Drives_ACS850_crane_control.pro project. The interface is divided into several sections:

- Left Panel:** Shows the project structure with 'PLC_PRG (PRG)' and 'speed_scaling'.
- Main Area:** Contains multiple PZD (Process Zoned Data) areas:
 - Status Word (PZD IN1):** 0x1737. Includes bits for RDY_ON, RDY_RUN, RDY_REL, TRIPPED, OFF_2_STA, OFF_3_STA, SWC_ON_INHIB, ALARM, AT_SETPOINT, REMOTE, ABOVE_LIMIT, EXT_CTRL_LOC, EXT2_RUN_ENAB, Reserved, and FBA_ERROR.
 - Crane SW1 (PZD IN4):** 0x443e. Includes bits for Slowdown active, Slowdown up act, Slowdown dn act, Upper lim, Lower lim, Load speed lim, Em ctrl active, Pwr on ack align, Load spd up lim, Load spd dn lim, Torque prove ok, Joystick zero pos, Watchdog rly ok, and Slack rope.
 - Crane SW2 (PZD IN5):** 0x0. Includes bits for Load slip, Brk ack mismatch, Slack rope, Not used, and others.
 - Crane FW (PZD IN6):** 0x0. Includes bits for Motor spd match, Torque prove, Brake slip, Inv overload, Safety close, Load spd match, End lim ID error, Watchdog, Slack rope, Brake not closed, and others.
 - Control Word (PZD OUT1):** 0x47f. Includes bits for OFF1_CONTROL, OFF2_CONTROL, OFF3_CONTROL, INHIBIT_OPERATION, RAMP_OUT_ZERO, RAMP_HOLD, RAMP_IN_ZERO, RESET, Not In use, REMOTE_CMD, EXT_CTRL_LOC, Reserved, and others.
 - Crane CW1 (PZD OUT4):** 0x0. Includes bits for Start fwd, Start rev, Acc/Dec sel, Slow ref mode, Step ref sel 1-4, Curr supervision, Mismatch ref, Upper limit, Lower limit, Slowdown IN1, Slowdown IN2, and Homing start.
 - Crane CW2 (PZD OUT5):** 0x0. Includes bits for Homing ack, Load spd lim sel, Slack rpy trng ens, Fault reset, Not used, and others.
- Right Panel:**
 - PZD IN 1-10 Read:** A table showing data for Main SW, Act 1, Act 2, Crane SW1, Crane FW, and PZD 10.
 - Parameter Write:** A table showing data for OUT1, OUT2, OUT3, OUT4, IN1, IN2, IN3, and IN4.
 - PZD OUT 1-10 Write:** A table showing data for Main CW, Ref 1, Ref 2, Crane CW1, Crane CW2, PZD 6, PZD 7, PZD 8, and PZD 10.
 - Speed Scaling Controls:**
 - Activate speed scaling:** A toggle button.
 - Speed ref scaled:** A field showing the reference speed.
 - Ref 1 (rpm):** A field set to 500.
 - Speed act scaled:** A field showing the actual speed.
 - Act 1 (rpm):** A field set to 500.
 - Speedometer:** A circular gauge showing speed from 0.0 to 1500.0 rpm.

Tool/Step

Crane control program supplement

ABB Drives profile; Stopping

1. The ABB Drives profile state machine defines the actions to take, when disabling certain bits of the Control word. When drive is running at reference speed, you can test different stop modes by disabling each Control word bit at a time:

Bit 0: Stop along currently active deceleration ramp, ACS850 parameter 22.03 or 22.05. Proceed to OFF1 ACTIVE; proceed to READY SWITCH-ON, unless other interlocks (OFF2, OFF3) are active. CW: 0x47e, SW: 0x1231.

The screenshot shows the CoDeSys software interface for the ABB Drives ACS850 crane control program. The main window displays several registers and their bit definitions:

- Status Word (PZD IN1):** 0x1231. Bits include: Bit 0: RDV_ON, Bit 1: RDV_RUN, Bit 2: RDV_REF, Bit 3: TRIPPED, Bit 4: OFF_3_STA, Bit 5: OFF_3_STA, Bit 6: SWC_ON_INHIB, Bit 7: ALARM, Bit 8: AT_GETPOINT, Bit 9: REMOTE, Bit 10: ABOVE_LIMIT, Bit 11: EXT_CTRL_LOC, Bit 12: EXT_RUN_ENAB, Bit 13: Reserved, Bit 14: Reserved, Bit 15: FBA_ERROR.
- Crane SW1 (PZD IN4):** 0x405e. Bits include: Bit 0: Slowdown active, Bit 1: Slowdown up act, Bit 2: Slowdown dn act, Bit 3: Upper lim, Bit 4: Lower lim, Bit 5: Load speed lim, Bit 6: End of active, Bit 7: Fwr on ack signal, Bit 8: Load spd up lim, Bit 9: Load spd dn lim, Bit 10: Torque prove ok, Bit 11: Brake slip warn, Bit 12: Joystick check, Bit 13: Joystick zero pos, Bit 14: Watchdog rly ok, Bit 15: Slack rope.
- Crane SW2 (PZD IN5):** 0x0. Bits include: Bit 0: Load slip, Bit 1: Brk ack mismatch, Bit 2: Slack rope, Bit 3: Not used, Bit 4: Not used, Bit 5: Not used, Bit 6: Not used, Bit 7: Not used, Bit 8: Not used, Bit 9: Not used, Bit 10: Not used, Bit 11: Not used, Bit 12: Not used, Bit 13: Not used, Bit 14: Not used, Bit 15: Not used.
- Crane FW (PZD IN6):** 0x0. Bits include: Bit 0: Motor spd match, Bit 1: Torque prove, Bit 2: Brake slip, Bit 3: Inv overload, Bit 4: Safety close, Bit 5: Watchdog, Bit 6: End of IO error, Bit 7: Load spd match, Bit 8: Slack rope, Bit 9: Brake not closed, Bit 10: Not used, Bit 11: Not used, Bit 12: Not used, Bit 13: Not used, Bit 14: Not used, Bit 15: Not used.
- Control Word (PZD OUT1):** 0x47e. Bits include: Bit 0: OFF1_CONTROL, Bit 1: OFF2_CONTROL, Bit 2: OFF3_CONTROL, Bit 3: INHIBIT_OPERATION, Bit 4: RAMP_OUT_ZERO, Bit 5: RAMP_HOLD, Bit 6: RAMP_IN_ZERO, Bit 7: RESET, Bit 8: Not in use, Bit 9: Not in use, Bit 10: REMOTE_CMD, Bit 11: EXT_CTRL_LOC, Bit 12: Reserved, Bit 13: Reserved, Bit 14: Reserved, Bit 15: Reserved.
- Crane CW1 (PZD OUT4):** 0x0. Bits include: Bit 0: Start fwd, Bit 1: Start rev, Bit 2: Acc/Dec ref, Bit 3: Stop ref mode, Bit 4: Stop ref mode, Bit 5: Stop ref sel 1, Bit 6: Stop ref sel 2, Bit 7: Stop ref sel 3, Bit 8: Stop ref sel 4, Bit 9: Curr supervision, Bit 10: Mismatch ref, Bit 11: Upper limit, Bit 12: Lower limit, Bit 13: Slowdown IN1, Bit 14: Slowdown IN2, Bit 15: Moving start.
- Crane CW2 (PZD OUT5):** 0x0. Bits include: Bit 0: Moving ack, Bit 1: Load spd lim sel, Bit 2: Slack rope brk ans, Bit 3: Fault reset, Bit 4: Not used, Bit 5: Not used, Bit 6: Not used, Bit 7: Not used, Bit 8: Not used, Bit 9: Not used, Bit 10: Not used, Bit 11: Not used, Bit 12: Not used, Bit 13: Not used, Bit 14: Not used, Bit 15: Not used.
- PZD IN 1-10 Read:** Main SW (PZD 1): 4957, Act 1 (PZD 2): 0, Act 2 (PZD 3): 0, Crane SW1 (PZD 6): 55542, Crane SW2 (PZD 7): 0, Crane FW (PZD 9): 0, PZD 10: 0.
- PZD OUT 1-10 Write:** Main CW (PZD 1): 1150, Ref 1 (PZD 2): 6666, Ref 2 (PZD 3): 0, Crane CW1 (PZD 4): 0, Crane CW2 (PZD 5): 0, PZD 6: 0, PZD 7: 0, PZD 8: 0, PZD 9: 0, PZD 10: 0.
- Autovile speed scaling:** Speed ref scaled: 500, Ref 1 (rpm): 500, Speed act scaled: 0, Act 1 (rpm): 0.

The interface also shows a speed scaling graph at the bottom right, with a scale from 0 to 1500.0 rpm. The status bar at the bottom indicates the system is ONLINE, RS323, SIM, RUNNING, and FORCE is ON.

Tool/Step Crane control program supplement

- Bit 2:** Emergency stop, according emergency stop ramp, defined by ACS850 parameter 22.12. Proceed to OFF3 ACTIVE; proceed to SWITCH-ON INHIBITED. CW: 0x47b, SW: 0x12d0.

The screenshot displays the CoDeSys software interface for the ABB Drives ACS850 crane control program. The main window shows several parameter tables and a speed scaling monitor.

Status Word (PZD IN1) 0x12d0

Bit 0: RDY_ON	Bit 1: RDY_RUN	Bit 2: RDY_REF	Bit 3: TRIPPED	Bit 4: OFF_2_STA	Bit 5: OFF_3_STA	Bit 6: SWC_ON_INHIB	Bit 7: ALARM	Bit 8: AT_SETPOINT	Bit 9: REMOTE	Bit 10: ABOVE_LIMIT	Bit 11: EXT_CTRL_LOC	Bit 12: EXT2_RUN_ENAB	Bit 13: Reserved	Bit 14: Reserved	Bit 15: FBA_ERROR
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Crane SW1 (PZD IN4) 0x409e

Bit 0: Slowdown active	Bit 1: Slowdown up act	Bit 2: Slowdown dn act	Bit 3: Upper lim	Bit 4: Lower lim	Bit 5: Load speed lim	Bit 6: Em cbrt active	Bit 7: Pwr on ack signl	Bit 8: Load spd up lim	Bit 9: Load spd dn lim	Bit 10: Torque prove ok	Bit 11: Brake slip vnn	Bit 12: Joystick zero pos	Bit 13: Joystick check	Bit 14: Watchdog rly obj	Bit 15: Slack rope
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Crane SW2 (PZD IN5) 0x0

Bit 0: Load slip	Bit 1: Brk ack mismatch	Bit 2: Slack rope	Bit 3: Not used	Bit 4: Not used	Bit 5: Not used	Bit 6: Not used	Bit 7: Not used	Bit 8: Not used	Bit 9: Not used	Bit 10: Not used	Bit 11: Not used	Bit 12: Not used	Bit 13: Not used	Bit 14: Not used	Bit 15: Not used
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Crane FW (PZD IN6) 0x0

Bit 0: Motor spd match	Bit 1: Torque prove	Bit 2: Brake slip	Bit 3: Inv overload	Bit 4: Safety close	Bit 5: Watchdog	Bit 6: End lim IO error	Bit 7: Load spd match	Bit 8: Slack rope	Bit 9: Brake not closed	Bit 10: Not used	Bit 11: Not used	Bit 12: Not used	Bit 13: Not used	Bit 14: Not used	Bit 15: Not used
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PZD IN 1-10 Read

Main SW (PZD 1)	4816
Act 1 (PZD 2)	0
Act 2 (PZD 3)	0
Crane SW1 (PZD 6)	16542
Crane SW2 (PZD 7)	0
Crane FW (PZD 9)	0
PZD 10	0

Parameter Write PZD 1-4 Output

OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

Parameter Read PZD 1-4 Input

IN1	0x0
IN2	0x0
IN3	0x0
IN4	0

PZD OUT 1-10 Write

Main CW (PZD 1)	1147
Ref 1 (PZD 2)	6666
Ref 2 (PZD 3)	0
Crane CW1 (PZD 4)	0
Crane CW2 (PZD 5)	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Activate speed scaling

Speed ref scaled: Ref 1 (rpm) 500

Speed act scaled: Ref 1 (rpm) 0

Speed monitor: 500.0, 1000.0, 1500.0

Control Word (PZD OUT1) 0x47b

Bit 0: OFF1_CONTROL	Bit 1: OFF2_CONTROL	Bit 2: OFF3_CONTROL	Bit 3: INHIBIT_OPERATING	Bit 4: RAMP_OUT_ZERO	Bit 5: RAMP_HOLD	Bit 6: RAMP_IN_ZERO	Bit 7: RESET	Bit 8: Not in use	Bit 9: Not in use	Bit 10: REMOTE_CMD	Bit 11: EXT_CTRL_LOC	Bit 12: Reserved	Bit 13: Reserved	Bit 14: Reserved	Bit 15: Reserved
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Crane CW1 (PZD OUT4) 0x0

Bit 0: Start fwd	Bit 1: Start rev	Bit 2: Acc/Dec sel	Bit 3: Step ref mode	Bit 4: Slow ref mode	Bit 5: Step ref sel 1	Bit 6: Step ref sel 2	Bit 7: Step ref sel 3	Bit 8: Step ref sel 4	Bit 9: Curr supervision	Bit 10: Mismatch ref	Bit 11: Upper limit	Bit 12: Lower limit	Bit 13: Slowdown IN1	Bit 14: Slowdown IN2	Bit 15: Homing start
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Crane CW2 (PZD OUT5) 0x0

Bit 0: Homing ack	Bit 1: Load spd lim sel	Bit 2: Slack rope frq ens	Bit 3: Fault reset	Bit 4: Not used	Bit 5: Not used	Bit 6: Not used	Bit 7: Not used	Bit 8: Not used	Bit 9: Not used	Bit 10: Not used	Bit 11: Not used	Bit 12: Not used	Bit 13: Not used	Bit 14: Not used	Bit 15: Not used
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The status bar at the bottom indicates: ONLINE: RS323 SIM RUNNING BF FORCE OV READ

Tool/Step

Crane control program supplement

3. **Bit 6:** Force ramp function generator input to zero. Ramp function generator input is forced to zero. Field excitation stays enabled. CW:43f, SW: 1337.

The screenshot displays the CodeSys environment for the project 'ABB_Drives_ACS850_crane_control.pro'. The main workspace is divided into several sections:

- Status Word (PZD IN1):** A table of 16 bits (Bit 0 to Bit 15) with their respective functions and current values. Bit 0 is 'RDY_ON' (0x1E37).
- Crane SW1 (PZD IN4):** A table of 16 bits (Bit 0 to Bit 15) with their respective functions and current values. Bit 0 is 'Slowdown active' (0x445e).
- Crane SW2 (PZD IN5):** A table of 16 bits (Bit 0 to Bit 15) with their respective functions and current values. Bit 0 is 'Load slip' (0x0).
- Crane FW (PZD IN6):** A table of 16 bits (Bit 0 to Bit 15) with their respective functions and current values. Bit 0 is 'Motor spd match' (0x0).
- PZD IN 1-10 Read:** A table of 10 bits (Main SW, Act 1, Act 2, Crane SW1, Crane SW2, Crane FW, PZD 10) with their respective values.
- Parameter Write:** A table of 4 bits (OUT1, OUT2, OUT3, OUT4) with their respective values.
- Parameter Read:** A table of 4 bits (IN1, IN2, IN3, IN4) with their respective values.
- PZD OUT 1-10 Write:** A table of 10 bits (Main CW, Ref 1, Ref 2, Crane CW1, Crane CW2, PZD 6, PZD 7, PZD 8, PZD 9, PZD 10) with their respective values.
- Activate speed scaling:** A section with 'Speed ref scaled' and 'Speed act scaled' buttons, and a speed reference value of 0.
- Speed reference:** A section with a speed reference value of 0 and a speed feedback value of 0.

The status bar at the bottom indicates the system is 'ONLINE: RS323' and 'RUNNING'.

Tool/Step

Crane control program supplement

ABB Drives profile; Run at reference torque

1. First reset any active faults, set Control word bits 7, 10 and 11 to TRUE(1). The green box next to the button indicates boolean TRUE (1). Control word: 0xc80. Status word: 0xb80.

The screenshot shows the CoDeSys software interface for the ABB Drives ACS850 crane control program. The main window displays several parameter tables and control elements:

- Status Word (PZD IN1):** 0xb80. Bits 0-15 are listed, with bits 7, 10, and 11 highlighted in green, indicating they are TRUE (1).
- Crane SW1 (PZD IN4):** 0xb80. Bits 0-15 are listed, with bits 7, 10, and 11 highlighted in green.
- Crane SW2 (PZD IN5):** 0xb80. Bits 0-15 are listed, with bits 7, 10, and 11 highlighted in green.
- Crane FW (PZD IN6):** 0xb80. Bits 0-15 are listed, with bits 7, 10, and 11 highlighted in green.
- PZD IN 1-10 Read:** A table showing input parameters like Main SW (PZD 1), Act 1 (PZD 2), etc.
- PZD OUT 1-10 Write:** A table showing output parameters like Main CW (PZD 1), Ref 1 (PZD 2), etc.
- Parameter Write:** A table showing parameters like PKW 1: 4 Output, OUT1, OUT2, etc.
- Parameter Read:** A table showing parameters like PKW 1: 4 Input, IN1, IN2, etc.
- Control Word (PZD OUT1):** 0xc80. Bits 0-15 are listed, with bits 7, 10, and 11 highlighted in green.
- Crane CW1 (PZD OUT4):** 0xb80. Bits 0-15 are listed, with bits 7, 10, and 11 highlighted in green.
- Crane CW2 (PZD OUT5):** 0xb80. Bits 0-15 are listed, with bits 7, 10, and 11 highlighted in green.
- Autovalue speed scaling:** A section showing speed scaling parameters like Speed ref scaled, Speed act scaled, and Aut 1 (rpm).
- Speed scaling:** A section showing speed scaling parameters like Speed ref scaled, Speed act scaled, and Aut 1 (rpm).

The status bar at the bottom indicates the system is ONLINE, RS323, SIM, RUNNING, BP, FORCE, ON, READ.

Tool/Step

Crane control program supplement

2. Set the drive ready to operate. Set following Control word bits to TRUE(1): 11,10,3,2,1. Control word: 0xc0e. Status word: 0x1b31.

The screenshot displays the CoDeSys software interface for the ABB_Drives_ACS850_crane_control.pro project. The main workspace is divided into several sections:

- Status Word (PZD IN1):** 0x1b31. Bits 0-15 are listed, with bits 0-15 showing various status indicators like RDY_ON, RDY_RUN, RDY_REF, TRIPPED, OFF_2_STA, OFF_3_STA, SWC_ON_INHIB, ALARM, AT_SETPPOINT, REMOTE, ABOVE_LIMIT, EXT_CTRL_LOC, EXT2_RUN_ENAB, and FBA_ERROR.
- Crane SW1 (PZD IN4):** 0x405a. Bits 0-15 are listed, including Slowdown active, Slowdown up act, Slowdown dn act, Upper lim, Lower lim, Load speed lim, Em ctrl active, Pwr on ack signl, Load spd up lim, Load spd dn lim, Torque prove ok, Brake slip warn, Joystick zero pos, Watchdog rly ok, and Slack rope.
- Crane SW2 (PZD IN5):** 0x0. Bits 0-15 are listed, mostly showing 'Not used' status.
- Crane Fw (PZD IN6):** 0x0. Bits 0-15 are listed, including Motor spd match, Torque prove, Brake slip, Inv overload, Safety close, Watchdog, End lim IO error, Load spd match, Slack rope, Brake not closed, and various 'Not used' bits.
- PZD IN 1-10 Read:** A table showing read values for Main SW (PZD 1), Act 1 (PZD 2), Act 2 (PZD 3), Crane SW1 (PZD 6), Crane SW2 (PZD 7), Crane Fw (PZD 9), and PZD 10.
- PZD OUT 5-10 Write:** A table showing write values for Main CW (PZD 1), Ref 1 (PZD 2), Ref 2 (PZD 3), Crane CW1 (PZD 4), Crane CW2 (PZD 6), PZD 6, PZD 7, PZD 8, PZD 9, and PZD 10.
- Control Word (PZD OUT1):** 0xc0e. Bits 0-15 are listed, with bits 0-15 showing control signals like OFF1_CONTROL, OFF2_CONTROL, OFF3_CONTROL, INHIBIT_OPERATION, RAMP_OUT_ZERO, RAMP_HOLD, RAMP_IN_ZERO, RESET, Not in use, REMOTE_CMD, EXT_CTRL_LOC, and various 'Reserved' bits.
- Crane CW1 (PZD OUT4):** 0x0. Bits 0-15 are listed, including Start fwd, Start rev, Acc/Dec sel, Step ref mode, Slow ref mode, Step ref sel 1, Step ref sel 2, Step ref sel 3, Step ref sel 4, Curr supervision, Mismatch ref, Upper limit, Lower limit, Slowdown IN1, Slowdown IN2, and Homing start.
- Crane CW2 (PZD OUT5):** 0x0. Bits 0-15 are listed, including Homing ack, Load spd lim sel, Slack rplng ena, Fault reset, and various 'Not used' bits.
- Parameter Write:** A table showing write values for PKW 1.4 Output, including OUT1, OUT2, OUT3, and OUT4.
- Parameter Read:** A table showing read values for PKW 1.4 Input, including IN1, IN2, IN3, and IN4.
- Activate speed scaling:** A section with buttons for 'Speed ref scaled' and 'Speed act scaled', and a speed scale from 0 to 1500.0 rpm.

The status bar at the bottom indicates the system is ONLINE, RS323, SIM, RUNNING, BP, FORCE, ON, and READ.

Tool/Step Crane control program supplement

- Start operating. Set following Control word bits to TRUE(1): 11,10,3,2,1,0. Control word: 0x0c0f. Status word: 0x1a37.

CobeSys - ABB_Drives_ACS850_crane_controlpro - [ABB_Drives_ACS850_Crane_control]

File Edit Project Insert Extras Online Window Help

POUs

- PLC_PRG (PRG)
- speed_scaling

Status Word (PZD IN1) 0x1a37

Bit 0: RDY_ON	1
Bit 1: RDY_RUN	1
Bit 2: RDY_REF	1
Bit 3: TRIPPED	0
Bit 4: OFF_2_STA	0
Bit 5: OFF_3_STA	0
Bit 6: SWC_ON/RHIB	0
Bit 7: ALARM	0
Bit 8: AT_SETPOINT	0
Bit 9: REMOTE	0
Bit 10: ABOVE_LIMIT	1
Bit 11: EXT_CTRL_LOC	0
Bit 12: EXT_CTRL_ENAB	0
Bit 13: Reserved	0
Bit 14: Reserved	0
Bit 15: FEA_ERROR	0

Crane SW1 (PZD IN4) 0x44be

Bit 0: Slowdown active	1
Bit 1: Slowdown up act	1
Bit 2: Slowdown dn act	1
Bit 3: Upper lim	1
Bit 4: Lower lim	1
Bit 5: Load speed lim	1
Bit 6: Em cdt active	0
Bit 7: Fwr on ack signl	0
Bit 8: Load spd up lim	0
Bit 9: Load spd dn lim	0
Bit 10: Torque prove ok	1
Bit 11: Brake slip warn	0
Bit 12: Joystick check	0
Bit 13: Joystick zero pos	0
Bit 14: Watchdog rly cdp	0
Bit 15: Slack rope	0

Crane SW2 (PZD IN5) 0x0

Bit 0: Load slip	0
Bit 1: Brk ack mismatch	0
Bit 2: Slack rope	0
Bit 3: Not used	0
Bit 4: Not used	0
Bit 5: Not used	0
Bit 6: Not used	0
Bit 7: Not used	0
Bit 8: Not used	0
Bit 9: Not used	0
Bit 10: Not used	0
Bit 11: Not used	0
Bit 12: Not used	0
Bit 13: Not used	0
Bit 14: Not used	0
Bit 15: Not used	0

Crane FW (PZD IN6) 0x0

Bit 0: Motor spd match	0
Bit 1: Torque prove	0
Bit 2: Brake slip	0
Bit 3: Inv overload	0
Bit 4: Safety close	0
Bit 5: Watchdog	0
Bit 6: End lim ID error	0
Bit 7: Load spd match	0
Bit 8: Slack rope	0
Bit 9: Brake not closed	0
Bit 10: Not used	0
Bit 11: Not used	0
Bit 12: Not used	0
Bit 13: Not used	0
Bit 14: Not used	0
Bit 15: Not used	0

PZD IN 1-10 Read

Main SW (PZD 1)	7736
Act 1 (PZD 2)	1718
Act 2 (PZD 3)	65366
Crane SW1 (PZD 5)	17566
Crane SW2 (PZD 7)	0
Crane FW (PZD 9)	0
PZD 10	0

Parameter Write

PRW 1: 4 Output	
OUT1	0x0
OUT2	0x0
OUT3	0x0
OUT4	0x0

Parameter Read

PRW 1: 4 Input	
IN1	0x0
IN2	0x0
IN3	0x0
IN4	0x0

Control Word (PZD OUT1) 0x0c0f

Bit 0: OFF1_CONTROL	1
Bit 1: OFF2_CONTROL	1
Bit 2: OFF3_CONTROL	1
Bit 3: INHIBIT_OPERATION	0
Bit 4: RAMP_OUT_ZERO	0
Bit 5: RAMP_HOLD	0
Bit 6: RAMP_IN_ZERO	0
Bit 7: RESET	0
Bit 8: Not in use	0
Bit 9: Not in use	0
Bit 10: REMOTE_CMD	0
Bit 11: EXT_CTRL_LOC	0
Bit 12: Reserved	0
Bit 13: Reserved	0
Bit 14: Reserved	0
Bit 15: Reserved	0

Crane CW1 (PZD OUT4) 0x0

Bit 0: Start fwd	0
Bit 1: Start rev	0
Bit 2: Acc/Dec sel	0
Bit 3: Step ref mode	0
Bit 4: Slow ref mode	0
Bit 5: Step ref sel 1	0
Bit 6: Step ref sel 2	0
Bit 7: Step ref sel 3	0
Bit 8: Step ref sel 4	0
Bit 9: Curr supervision	0
Bit 10: Mismatch ref	0
Bit 11: Upper limit	0
Bit 12: Lower limit	0
Bit 13: Slowdown IN1	0
Bit 14: Slowdown IN2	0
Bit 15: Homing start	0

Crane CW2 (PZD OUT5) 0x0

Bit 0: Homing ack	0
Bit 1: Load spd lim sel	0
Bit 2: Slack rp frq ana	0
Bit 3: Fault reset	0
Bit 4: Not used	0
Bit 5: Not used	0
Bit 6: Not used	0
Bit 7: Not used	0
Bit 8: Not used	0
Bit 9: Not used	0
Bit 10: Not used	0
Bit 11: Not used	0
Bit 12: Not used	0
Bit 13: Not used	0
Bit 14: Not used	0
Bit 15: Not used	0

PZD OUT 1-10 Write

Main CW (PZD 1)	3067
Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	0
Crane CW1 (PZD 4)	0
Crane CW2 (PZD 5)	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0

Activate speed scaling

Speed ref scaled: 0

Ref 1 (rpm): 0

Speed act scaled: 123

Act 1 (rpm): 123

588.0 588.0 1000.0 1000.0 1500.0 1500.0

ONLINE: RS-323 [SIM] RUNNING [BF] [FORCE] [OV] [READ]

Tool/Step Crane control program supplement

- Run at reference torque. The scaling of torque is according to the ABB Drives profile. Reference 10000 corresponds to 100.00 % torque. Insert the desired reference torque to **Ref 2 (PZD 3)** field and press enter. The drive ramps up to the reference torque.
If Speed limit (par 20.01) is met, the motor runs at TORQ REF SP LIM (par 3.12) to prevent motor rush.

You can monitor actual torque from the **Act 1 (PZD 3)** field.

You can monitor the actual cyclic data flow over fieldbus in **PZD 1-10** areas.

The screenshot shows the CoDeSys software interface for the ABB_Drives_ACS850_crane_control.pro project. The interface is divided into several sections:

- Status Word (PZD IN1):** Displays 16 bits of status information, including motor status, limits, and errors.
- Crane SW1 (PZD IN2):** Displays 16 bits of status information, including motor status, limits, and errors.
- Crane SW2 (PZD IN3):** Displays 16 bits of status information, including motor status, limits, and errors.
- Crane FW (PZD IN4):** Displays 16 bits of status information, including motor status, limits, and errors.
- PZD IN 1-10 Read:** A table showing the values of PZD IN 1-10. The table is highlighted with a red box. The values are:

PZD IN 1-10 Read	Value
Main SW (PZD 1)	7725
Act 1 (PZD 2)	19799
Ref 2 (PZD 3)	526
Crane SW1 (PZD 6)	17568
Crane SW2 (PZD 7)	0
Crane FW (PZD 8)	0
PZD 9	0
PZD 10	0
- PZD OUT 1-10 Write:** A table showing the values of PZD OUT 1-10. The table is highlighted with a red box. The values are:

PZD OUT 1-10 Write	Value
Main CW (PZD 1)	3087
Ref 1 (PZD 2)	0
Ref 2 (PZD 3)	2000
Crane CW1 (PZD 4)	0
Crane CW2 (PZD 6)	0
PZD 6	0
PZD 7	0
PZD 8	0
PZD 9	0
PZD 10	0
- Control Word (PZD OUT1):** Displays 16 bits of control information, including motor status, limits, and errors.
- Crane CW1 (PZD OUT4):** Displays 16 bits of control information, including motor status, limits, and errors.
- Crane CW2 (PZD OUT5):** Displays 16 bits of control information, including motor status, limits, and errors.

Appendix A - How to find out the serial communication parameter values of your PC?

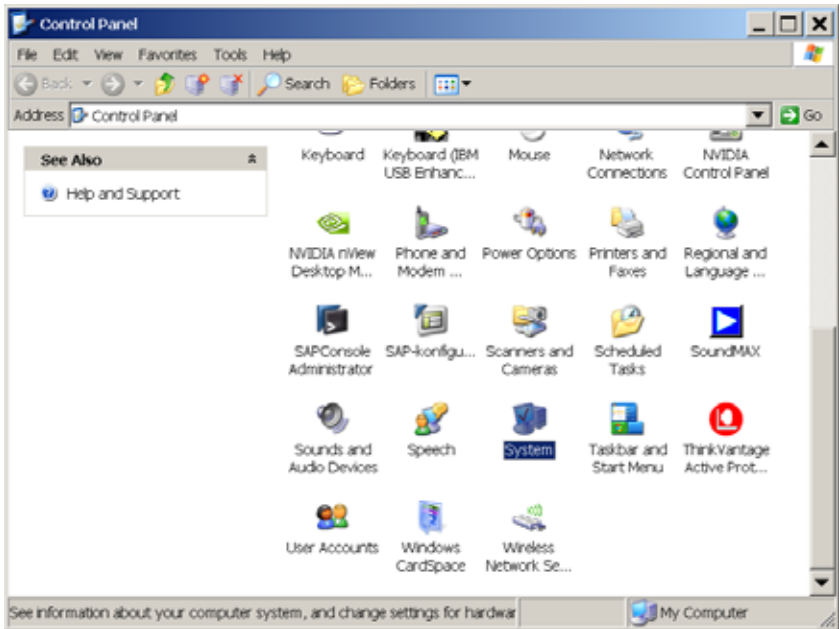
What this chapter contains

This chapter instructs how to find out the serial communication parameter values of your PC.

Tool/Step	How to find out the serial communication parameter values of your PC?
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- Go to Windows Control Panel and click the **System** icon.

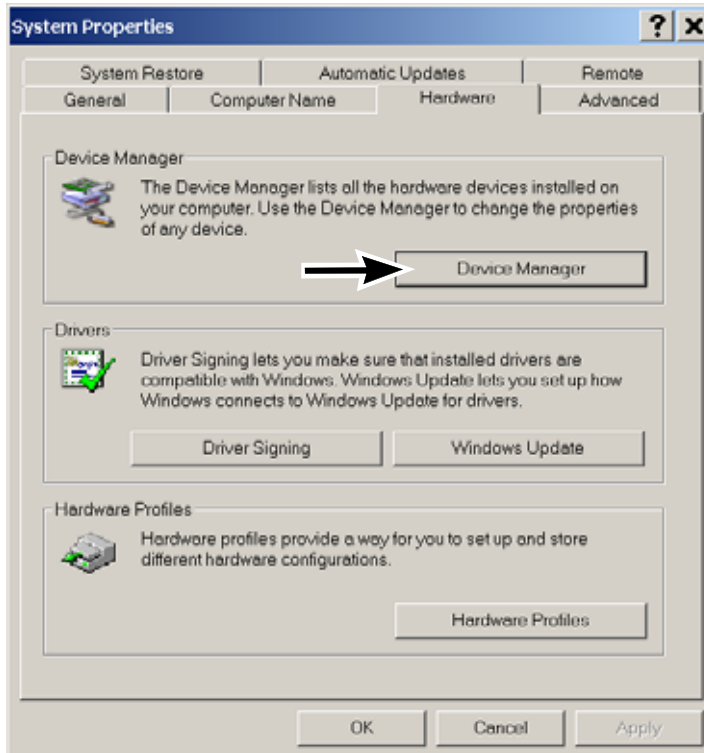
Microsoft Windows



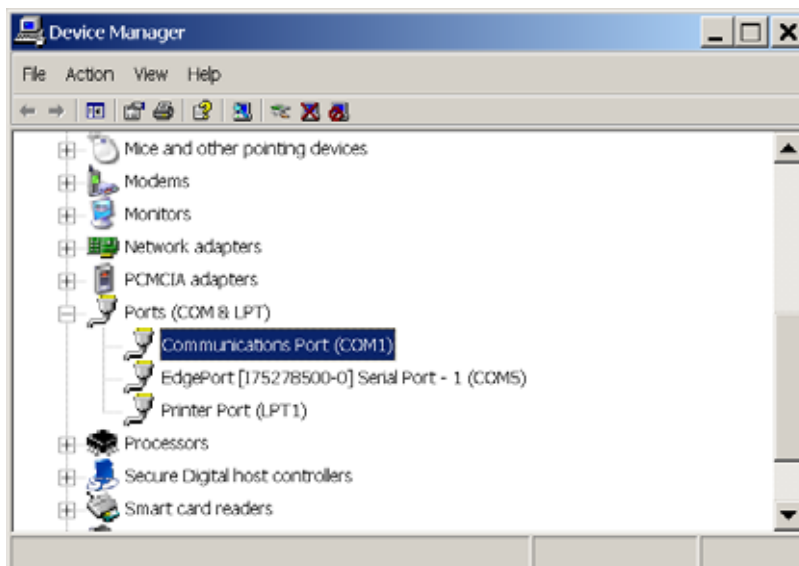
Tool/Step

How to find out the serial communication parameter values of your PC?

2. Click the **Hardware** tab and then the **Device Manager** button.

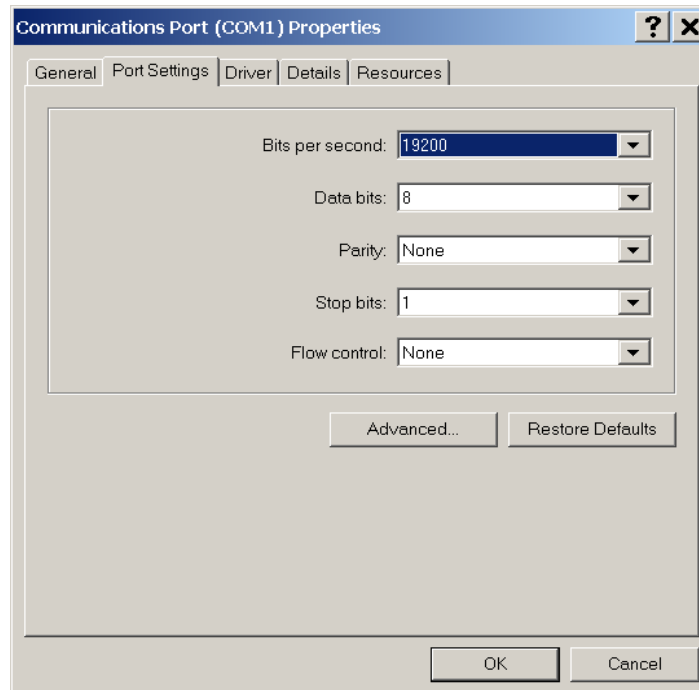


3. In the Ports (COM & LPT) folder, click Communications Port, which is connected to AC500, in this case port (COM1).



Tool/Step How to find out the serial communication parameter values of your PC?

4. The communication port settings are shown.



Further information

Product and service inquiries

Address any inquiries about the product to your local ABB representative, quoting the type designation and serial number of the unit in question. A listing of ABB sales, support and service contacts can be found by navigating to www.abb.com/drives and selecting *Sales, Support and Service network*.

Product training

For information on ABB product training, navigate to www.abb.com/drives and select *Training courses*.

Providing feedback on ABB Drives manuals

Your comments on our manuals are welcome. Go to www.abb.com/drives and select *Document Library – Manuals feedback form (LV AC drives)*.

Document library on the Internet

You can find manuals and other product documents in PDF format on the Internet. Go to www.abb.com/drives and select *Document Library*. You can browse the library or enter selection criteria, for example a document code, in the search field.



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